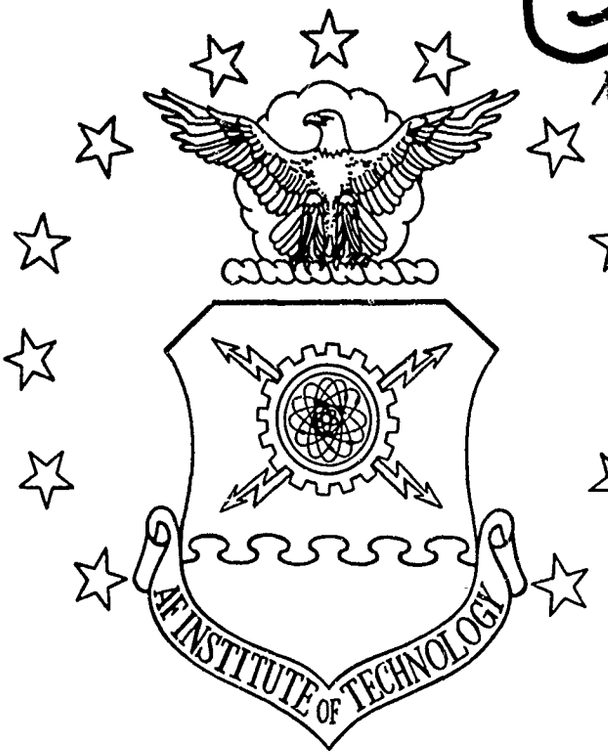

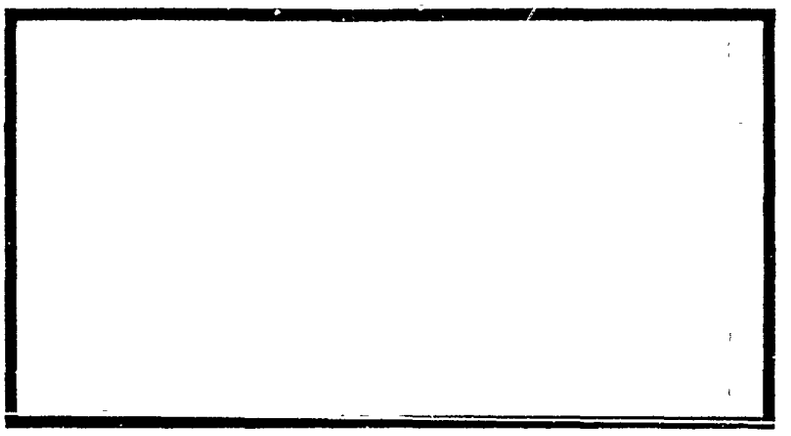

UNITED STATES AIR FORCE

AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

(3) LEVEL II

AIR FORCE ACQUISITION LOGISTICS DIVISION ITS CREATION AND ROLE

Clarke W. Powers, Captain, USAF
Thomas J. Recktenwalt, GS-12

LSSR 32-78B

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This thesis is a study of the Air Force Acquisition Logistics Division (AFALD) and how it fits into the acquisition community. The accomplishments of AFALD are examined against its objectives of influencing logistics supportability early in the acquisition process and providing a smooth transition of management responsibility from AFSC to AFLC at PMRT. To accomplish this, the thesis begins with a discussion of the acquisition process and a chronological development of the acquisition philosophy and structure from the Army Signal Corps in 1917 to the creation of AFALD. Then AFALD, along with its deputates, are examined as to mission and structure for interface into the acquisition community. Accomplishments of AFALD are then compared to AFALD's stated mission and objectives. Finally, several questions concerning lines of authority and responsibility are raised about the various organizations involved in the acquisition process.

LSSR 32-78B

AIR FORCE ACQUISITION LOGISTICS DIVISION
ITS CREATION AND ROLE

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

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DATE: 8 September 1978

Leslie M. Norton
COMMITTEE CHAIRMAN

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OVERVIEW

Introduction

> In the early 1960's a concept which considers the total costs of ownership of a system over its entire life, including the costs of development, acquisition, operating, support, and disposal of the system, emerged as an improved procurement technique. This technique is called life cycle costing (LCC) [78:1].

The LCC concept was implemented within the United States Air Force (USAF) because of the increasing cost and complexity of new Air Force weapon systems.[1] This implementation resulted in the establishment of the Air Force Acquisition Logistics Division (AFALD), a part of the Air Force Logistics Command (AFLC), on 1 July 1976 (34). AFALD is specifically responsible for reducing the operating and support (O&S) cost component of any new Air Force weapons system (63:1). However, the costs of operating and

---

[1] weapon system--refers to technically complex items such as planes, missiles, ships, and tanks. The term includes the major item of equipment and the techniques, hardware, subsystems, and personnel needed to operate and support that major item of equipment.

maintaining any new weapon system are determined primarily by the design of the weapon system. For this reason AFALD is closely interfaced with the Air Force Systems Command (AFSC) which is responsible for the acquisition and production of new Air Force weapons systems (75:p.1-1).

Problem Statement

Under the new philosophy of controlling LCC of weapon systems, logistics considerations and performance considerations require close interrelationship.

If the AFALD is to effectively operate, then the other members of the acquisition community must be aware of the goals, structure, and operating procedures of AFALD. Documentation of the gestation of the AFALD is in the form of letters, memos, directives, executive summaries, implementation plans, and in the memories of those who created the present organizational structure of AFALD. These documents and records are maintained in several separate organizations: among these are Headquarters, Air Force Logistics Command (HQ AFLC); Headquarters, Air Force Acquisition Logistics Division (HQ AFALD); and Headquarters, Air Force Aeronautical Division (HQ ASD) of the AFSC. There is a need to identify and document the background, organizational structure, and goals of the AFALD.

Justification

The acquisition community within the USAF comprises a number of diverse and complex organizational bodies. Among these are the AFALD of the AFLC, AFSC, Air Force Test and Evaluation Center (AFTEC), and the using commands for the new weapon system (38:56; 39:58; 40:104). Each of these organizations plays a specific role in the overall acquisition structure of procuring new Air Force weapons. However, no single organization is completely responsible for the overall acquisition of any new system (68). Because of this fact, no single organization can be held accountable for failure to meet the ultimate goals of performance, supportability, and of reasonable costs (77). And, because of this fragmented acquisition process, it is extremely important that each of the organizations which has a role in the weapons systems acquisition process is fully aware of the interfaces between it and the other organizations (42).

One of the goals of the AFALD is to " . . . clarify interfaces and consolidate activities both internal and external to the command [AFLC] [63:A-8]." It is of paramount importance that the function, working organization, and goals of AFALD are fully understood by the rest of the

acquisition community. If AFALD is to achieve its mission of driving down the O&S component of the total LCC of each new weapon system, then its role must be clearly understood by all. A comprehensive synthesis of AFALD's background, organizational structure, and goals is needed to resolve this lack of documentation.

Scope/Limitations

This research effort will be concerned with the AFALD itself and its relationship with the other organizations involved in new systems acquisition, primarily AFSC. A detailed description of the other organizations within the acquisition community will not be undertaken.

Objectives

The objectives of this thesis are:

1. To determine the causative factors within the acquisition philosophy of the USAF that led to the establishment of the AFALD.

2. To ascertain the goals and objectives of the AFALD.

3. To examine the mission of AFALD and explain how it is organized to accomplish this mission.

4. To re-examine AFALD's mission in light of its brief history.

Research Questions

1. What is the historical background that led to the development of the AFALD?

2. Why is the AFALD configured as it is and how does it function?

3. What are the goals and objectives of the AFALD?

4. How does AFALD interface with AFSC and other organizations involved in the acquisition process?

5. What are the accomplishments of AFALD at the present time (1978)?

METHODOLOGY

Data Sources

For a research effort of this type, there are two primary sources of data. They are: (1) written data that consist primarily of communications involving the conceptualization of AFALD and its development, and (2) unwritten data that are contained in the memories of those Air Force personnel who had a role in either the conceptualization/development of AFALD or are currently involved in the operations of AFALD. Each source of data, the classification of those data, and the collection of pertinent data will be discussed separately.

Written data. Written data consisted of two categories: written conceptualization concerning the AFALD concept and

written data that pertained to the development and implementation of AFALD.

Data pertaining to the conceptualization of the AFALD consisted in the form of published and unpublished research studies about the theory of LCC. In addition, there existed letters and messages between the major commands, i.e., AFLC, AFSC, and HQ USAF. Before AFALD could be developed to meet a need or solve a problem, that problem had to exist. The problem was the growing concern over the cost of the O&S component of the LCC of any new weapon system. Research studies were initiated to discuss and determine the parameters of this problem. All data were integrated into understanding the problem.

Written data that pertained to the development and implementation of the AFALD existed in the form of messages, letters, implementation plans, speeches, briefings, regulations, and other USAF documents. These documents show the written plans for the structure and operating concept of the AFALD and the time-phased actions necessary to implement them.

The location of these data are in the History Offices of AFLC, AFSC, ASD, AFALD, and HQ USAF. Access to the historical files of AFLC, AFALD, and ASD has been gained. These data have been screened so as to determine

the reasons for the creation of the AFALD and the decisions that were made in order to produce the present structure of the organization. This analysis of historical fact was used to answer subsets of the research questions. Also, it should be noted that in the 25 months of its existence, AFALD has undergone several significant changes in structure. This research has of necessity accounted for these changes of structure and the reasons for them.

Unwritten data. As previously mentioned, there exist a large body of unwritten data regarding the conceptualization and development of the AFALD. These data exist only in the minds of the Air Force personnel who either helped to develop or implement AFALD or are currently members of the AFALD staff. Data of these type are extremely important to capture because of their volitility and informational content. This information is volitile because of the unreliability of the human memory and the relative transience of the personnel who possess it.

The Air Force personnel who helped to create the current structure of the AFALD were selected from the staff of AFLC. Using guidance provided by HQ USAF, these selected staffers wrote and coordinated the plans that led to the

creation of AFALD. Many of these Air Force personnel, both military and civilian, still work at Wright-Patterson AFB.

Of the personnel directly involved in the implementation of AFALD, several transitioned from their previous jobs to positions in AFALD, or remained at Wright-Patterson AFB in some other capacity. These personnel were interviewed by the AFALD and AFLC historians; Mr. Vernon D. Burke and Mr. Robert J. Smith. Data contained in the interviews were used to answer the research questions concerning the historical development and configuration of the initial AFALD.

The Air Force personnel who currently are involved in the day-to-day operation of AFALD are important to this research because no organization is static over time. In order to answer the subsets of the research questions that try to explain the ongoing mission and goals of AFALD, it was important to obtain information from those personnel who are presently changing AFALD by their managerial functions. In order to capture this information, selected AFALD deputies were selected for interview using unstructured techniques. These deputies were:

1. Procurement and Production AFALD/PP
2. Acquisition Programs AFALD/SD

3. Acquisition Plans & Analysis AFALD/XR

4. Readiness Development AFALD/AQ

5. Product Evaluation, Engineering & Test AFALD/PT

6. KC-10 AFALD/YT

They were selected because of their importance in achieving the goals and objectives of the organization. Five of the six deputies or assistant deputies were interviewed. The sixth (AFALD/PP) was unable to grant an interview.

The research effort involving the cooperation of AFALD personnel was approved by the Chief of Staff of AFALD. Each deputy was contacted by telephone in order to secure an interview. To facilitate information transfer and in order to consume minimum time, each interviewee was provided a list of potential questions to ease their preparation. The interviews were accomplished and the information gathered was integrated into the synergistic whole (thesis).

Data Analysis Plan

Following selection of data from both written and unwritten sources, the data were analyzed using the following criteria:

1. Are the data relevant to the research topic? In order to test this criterion the researchers compared all data to alternate sources of data to test for

consistency. Also, data gathered from written sources were discussed with selected interviewees for their assessment of their relevance.

2. Are the data reliable? Reliability testing was determined by the best judgement of the researchers considering the source of the data and the credence given to the source by the researchers.

Chapter 2

LITERATURE REVIEW

Evolution of the Acquisition Philosophy

> The philosophy for acquisition of weapons systems within the United States Air Force appears to have traveled a full circle [3:1].

In the early years of aviation the acquisition philosophy was to proceed cautiously, to build upon each previous step to arrive at a new system. The sequence was basic hypothesis, research, development, prototype, and finally to production and introduction. Logistics considerations of maintenance, supply, and transportation for the new weapon system were considered part of this process, or in other words, the idea was to prove the product by "flying before buying" (3:10-14). This acquisition philosophy had the benefit of producing a well-engineered, tested weapon system, with support factors built in by a proper design at a reasonable cost per unit. The major disadvantage of this process is that it is time consuming; however, in the early years, time was not a major consideration. This philosophy was used by the U.S. Army Signal Corps, United States Army Air Force, and finally the USAF up until the 1950s (72:9-50).

In the early 1950s the acquisition philosophy of the USAF began to change. The Soviet Union's orbiting of the SPUTNIK (1957) satellite and subsequent space successes caused a technological shock to the United States. Because of this shock, the United States perceived itself to be in a technological race with the Soviet Union. Also, the United States was aware that the Soviet Union was actively developing an Intercontinental Ballistic Missile (ICBM) capability (3:16-19,21; 13:7). This threat to our national security provided the impetus for a change in our acquisition philosophy from "fly before buy" to "concurrency."

The concurrency concept states that in order to produce a system in less time, one phase of the acquisition process[1] should be started before the previous one is completed. This concept eliminates the need for prototypes. Prototypes were replaced by paper studies. This acquisition philosophy was successful in producing weapon systems at a rapid pace (68:9). Major defects within this

---

[1]The phases of the acquisition process are: conception, validation, full engineering development, and production. Each phase must be preceded by a decision of the Secretary of Defense (SecDef) to continue the process. The SecDef decision is primarily based on the results of the preceeding phase.

philosophy are higher cost per unit and post-production solutions of designed-in defects (42).

> The key point to remember is that with this philosophy, time is the driving mechanism—management is devoted to time reduction, and cost reduction must of necessity play a lesser role [3:31].

The concurrency concept was used as the acquisition philosophy up until the early 1970s when the cost growth of new Air Force weapon systems caused a reappraisal of our acquisition philosophy by the SecDef and Congress. This reappraisal was driven by the cost overruns of a number of major Air Force, Army, and Navy weapon systems (13:50-67; 32:6; 68:5-6).

During this time period the LCC theory became predominant. The LCC theory, as was noted earlier, states that the total cost of a weapons system is not only the cost of acquiring the new weapons system, but the cost of operating and maintaining it through its total operational life, as well as its disposal (20:1; 23:4). The dramatic increase in acquisition cost, and the fact that the O&S component became larger than the acquisition component, led to a change in our acquisition philosophy from concurrency back to a philosophy of prototyping (58:5,7-8; 72:1-3).

Current Acquisition Process

The development of any new weapons system contains risk and uncertainty: technical and cost uncertainty, long lead times of seven to ten years to place a system in operation, and uncertainty of the future threat. These factors make the weapon system acquisition process difficult. When these factors are combined with the current situation of budget cuts, inflation, aging forces, rising manpower costs, and development and acquisition cost overruns, the acquisition of new weapons systems presents the Department of Defense (DOD) with seemingly insoluable problems (43:2-3).

In order to control these problems, the DOD has issued a major directive that establishes the present policy for acquisition of a major defense system for all military departments--DOD Directive (DODD) 5000.1, "Major System Acquisition" (77:1-2).

The procedures set forth in DODD 5000.1 for conduct and review of major system acquisition programs are explicit and provide guidance for implementing the Office of Management and Budget (OMB) Circular A-109, "Major System Acquisitions," dated 5 April 1976. The Office of the Secretary of Defense (OSD), along with the Air Force and other DOD

components, is actively involved with the systems development throughout all phases outlined in the directive (Figure 1) (77:1-2).

OMB Circular A-109 requires a continuing mission area analysis. When this analysis (conducted by the services and/or DOD) perceives that a mission need exists and determines that a new capability must be acquired to meet that need, then a Mission Element Need Statement (MENS) is submitted to OSD. The MENS is the document that supports the determination of the need (77:2).

If the mission need is determined "to be essential" by the SecDef and he approves the mission need, then the Acquisition Process (Program Initiation) is started to explore alternative system design concepts to satisfy the approved need. This first key decision is Milestone 0 (77:2; 79:8-9).

When progress indicates that a proof of concept has been demonstrated, the alternative system design concepts selected for competitive demonstration are submitted by the Air Force to the SecDef (79:16).

> The recommendations shall be documented in a Decision Coordination Paper (DCP), and reviewed by the Defense System Acquisition Review Council (DSARC) and the (Service) System Acquisition Review Council ((S)SARC) prior to the Secretary of Defense decision . . . [77:3].

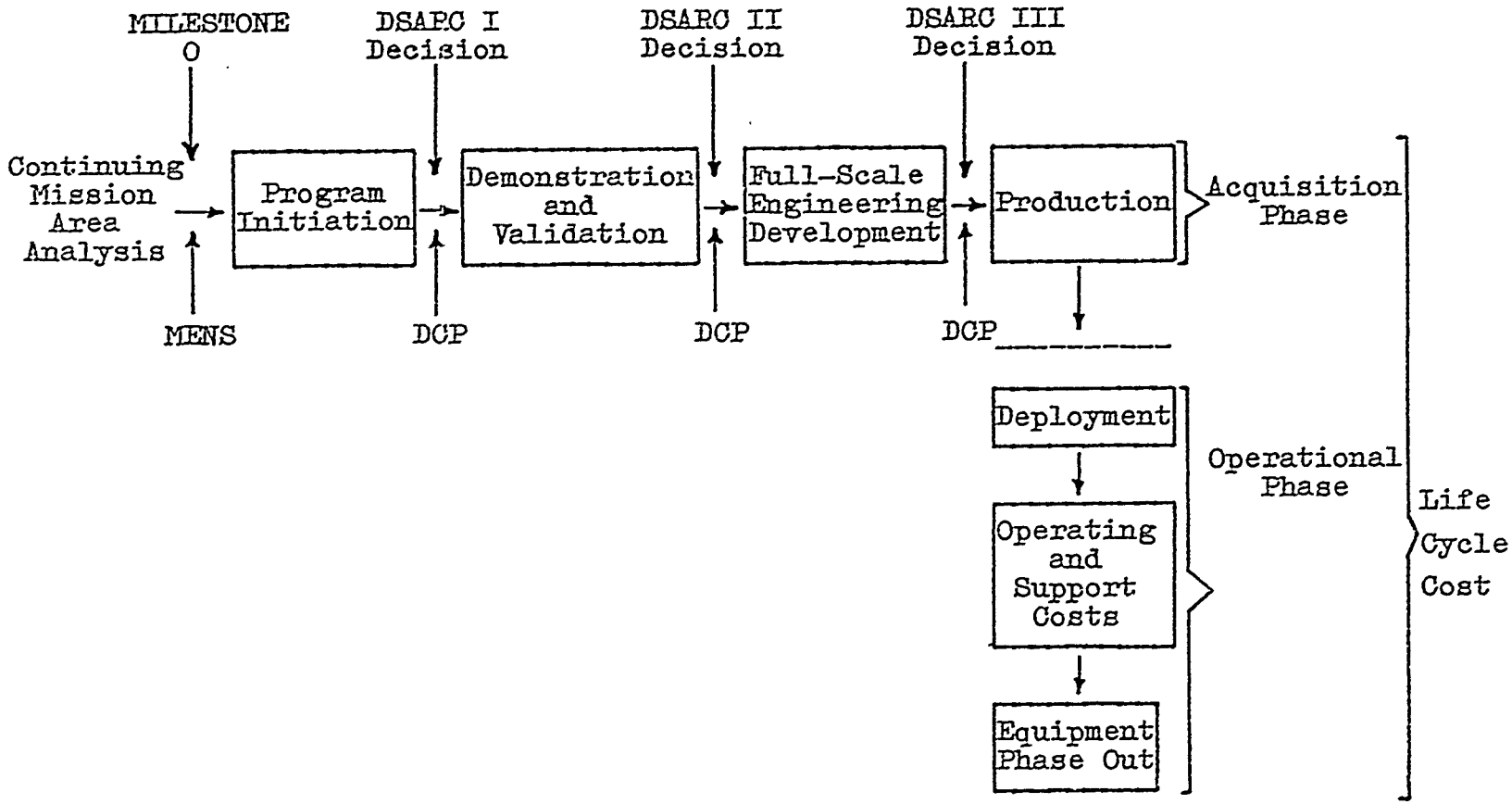

Figure 1

Weapons Acquisition Process/Life Cycle[2]

[2]Adapted from "Operating and Support Cost Development Guide for Aircraft Systems" (14:5).

The SecDef will reaffirm the mission need, program objectives, and approve one or more alternatives for demonstration and validation (77:3). This second key decision is DSARC I.

Competitive demonstrations are initiated to verify that the approved concepts are valid, work in an operational environment, and provide a basis for selection of the design concepts to be continued into full-scale development. These demonstrations normally use some type of prototype(s) (79:16).

Once the demonstration has verified that the chosen design concept is valid and the Air Force is prepared to recommend the preferred systems for full-scale engineering effort, documentation submitted by the Air Force in the form of a revised DCP is reviewed by the DSARC and (S)SARC prior to SecDef decision. When the mission need and program objectives are reaffirmed, selection of a system for full-scale engineering development will be made by the SecDef. This includes procurement of long lead time production items and limited production of operational test and evaluation. This third key decision is DSARC II (77:4; 79:15-18).

Following satisfactory test results, the cycle of DCP submittal, (S)SARC review, DSARC review, and the

SecDef decision is repeated. This fourth key decision is DSARC III (77:4; 79:18-20).

> At this point, the desired system should be a practical engineering design with operational suitability, need, firm cost estimates, and technical feasibility problems resolved [43:24].

Following DSARC III, the final stage of the Acquisition process is Production.

AFALD's Position in the Acquisition Community

The previous section was a brief overview of the major acquisition structure of DOD. The predominant organization within the Air Force that is concerned with new systems procurement is the AFSC. Its divisions, the Aeronautical Systems Division (ASD), the Electronic Systems Division (ESD), the Space and Missiles Systems Organization (SAMSO), and the Armament Development and Test Center (ADTC), contain the System Program Offices (SPOs) for each new weapon system under development. The specific responsibilities of each SPO are to meet the requirements and characteristics stated in the MENS. The SPO is further responsible for meeting the design specifications within the cost targets established for the acquisition of the new weapon system. The Program Manager, i.e., SPO, however, is not responsible for controlling

downstream O&S costs. If the Program Manager can deliver a new weapon system on time, which meets its performance specifications and is within his cost target, he is termed a success. He is neither criticized nor praised for controlling out-year O&S costs (32:8-9).

The recipient of these out-year O&S cost determinations is the operating command of the new weapon system and AFLC. The operating command, for example Tactical Air Command (TAC) for a new fighter, must maintain its fighters out of its Operations and Maintenance (O&M) appropriation supplied annually by congressional action (65:54-55). AFLC provides support to the using command in the form of spare parts, Programmed Depot Maintenance (PDM), repair of systems and components and depot field team maintenance. Once a weapon system has transitioned from AFSC to AFLC at the Program Management Responsibility Transfer (PMRT) point, AFLC is responsible for supporting the new weapon system in a timely and cost-effective manner. However, by the time the new weapon system is in production the major components of O&S cost have already been designed into the weapon system by the design team under the direction of the SPO. In fact, about 70 percent of our total O&S costs for the life of the weapon are

essentially determined during the conceptual stages of equipment development (Figure 2) (23:7).

In order to reduce the total LCC of a new weapon system, both the acquisition cost and the O&S cost components should be reduced. The determination of the acquisition cost is the responsibility of the Program Manager and the design team. Since AFLC becomes the manager of each new weapon system at PMRT, it assumes full responsibility for maintenance and support. Therefore, the reduction of O&S costs is the responsibility of AFLC. Historically, AFLC has had no way of influencing the SPO to make design changes for out-year O&S cost reductions. The O&S costs were not considered a serious problem until their magnitude exceeded that of the acquisition cost of new weapons systems (79:1-2). In order to influence O&S cost considerations, AFLC has had liaison with the SPOs for several years. AFLC had no directive or regulation that could be used to influence AFSC and the SPOs to actively reduce O&S costs (68:17). Also, since the acquisition cost of a new weapon system is appropriated directly for the system by Congress, only those decisions that would effect acquisition cost were seriously considered by the SPOs (32:8-9; 65:54-55).

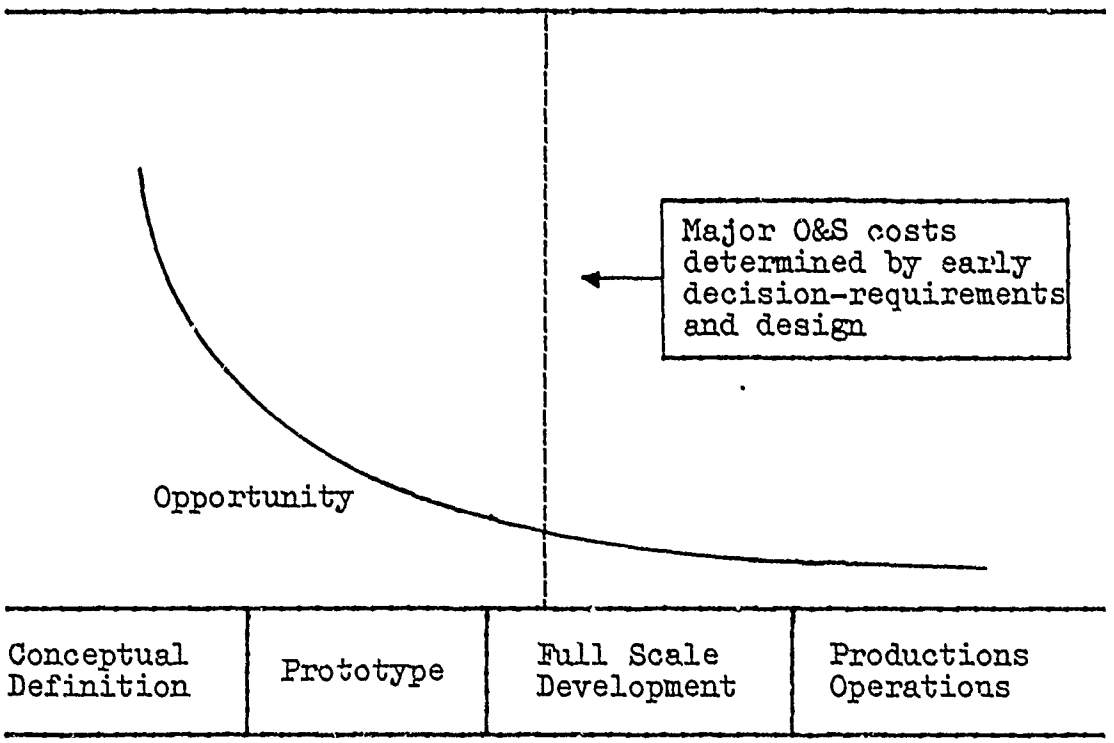

Figure 2

Operating and Support (O&S) Cost Reduction Opportunity [16:10]

In order to lower the O&S cost components of new weapon systems, the Chief of Staff of the Air Force and the SecDef directed that O&S cost components would be of equal consideration with performance specifications for all new weapon systems (58:7). To achieve this goal the Air Force commissioned the AFLC to develop a separate organization to deal with this problem (34). This organization, termed the AFALD, was configured to interface with the acquisition community. Specifically, its purpose is to insure consideration of the O&S component in the acquisition process. One principal means of performing this mission is by having representation in ASD, ESD, SAMSO, and ADTC (61:p.1-1). This interface is intended to " . . . identify and foster methods for reducing operating/support costs of aeronautical, electronic, and space systems [63:A-8]."

Chapter 3

THE CHANGING ACQUISITION STRUCTURE

Approach

It has been shown that the acquisition philosophy used to procure new weapon systems has changed over time to keep pace with the environment under which the Military Departments have had to operate. As the philosophy has changed so has the structure that implements that philosophy. The philosophy, as previously noted, has changed from prototyping to concurrency and back to prototyping. This section will illustrate the changes in acquisition structure needed to keep pace with the revolving acquisition philosophy. It should be noted that during this whole period, a recurring problem has presented itself for solution. The problem is basically the interface between the organization that researches and designs new weapons with the organization that must produce and/or logistically support these new weapons. It will be shown that the solution to this problem has been basically the same over and over again.

First Iteration--U.S. Army Signal Corps

The Air Force's weapon system acquisition structure had its beginnings in Ohio. In 1917 the U.S. Army

Signal Corps Science and Research Division was established at McCook Field, Dayton, Ohio. The organization had two sections; one for research and development (R&D) and the other for production (3:10-11). Each section assigned an engineer to manage each new project, i.e., project engineer. When the new weapon system was completely designed, the project engineer for R&D passed his responsibility to the project engineer for production. "It was this transfer of responsibility between two project engineers that gave the organization its problems [3:11]." The problem existed because of the lack of communication between the two organizations. In this situation, R&D designed weapons that production could not easily produce or support.

This split of management responsibility has had a major impact on the form of the acquisition structure. Would it be better for one organization to have complete responsibility for the entire acquisition process or have several organizations, functionally oriented, to split the responsibility. The U.S. Army recognized this problem and commissioned a study to provide a solution. The study recommended,

> An individual be selected and given the title of General Manager or Director of Engineering and Production with full authority [3:11].

Before this recommendation could be acted upon the First World War ended.

During the twenties and thirties the United States saw a growth of the aircraft industry. This fledgling industry attempted to sell aircraft to the United States Army Air Corps by providing unsolicited prototype aircraft. These aircraft were designed completely by the company with no Air Corps requirements input. This had the effect of reducing the Air Corps R&D establishment. Because of the limited interest in military aviation during this period there was little production capability within the aircraft industry. The emphasis was primarily in development (3:12). As a result, when World War II started, the prototyped aircraft went immediately into production. The remaining R&D function within the Air Corps was used to fix defects in the mass-produced prototypes. R&D was turned over to college and university scientists for the duration of World War II. At the end of the war the Air Corps found, "its R&D organization technically weakened by the diversion of its talents to developing fixes for operational aircraft [3:13]."

Second Iteration--Consolidation

In 1946 the Air Material Command (AMC) was established. One of its missions was to revitalize the Army

Air Corp's weakened R&D functions. The following year the USAF became a separate military department incorporating AMC into its structure. AMC was charged with "research and development, procurement and industrial mobilization planning, and supply and maintenance [72:xiii]." In other words, responsibility for the entire acquisition process belonged to AMC.

Third Iteration--Another Split

In the 1950s increased technological competition with the Soviet Union led to increased interest in R&D. In addition, the cost of procurement for maintenance of existing weapon systems was having a detrimental effect on the availability of funds for R&D. To address this problem, two independent studies were initiated, one led by Dr. Louis Ridenour and the other led by the Air University. Both studies recommended that a separate R&D command be established (3:14-16).

As a result of these studies, the Air Research and Development Command (ARDC) was established. Under this new reorganization ARDC would be responsible for R&D with its own funding, and AMC dollars could be concentrated on procurement and production (72:6).

Now the acquisition process was split between R&D and Procurement, Production and Maintenance. This split responsibility is identical to the division of authority in the Signal Corps Science and Research Division. It would experience the same problems of coordination that the Army Signal Corps experienced in 1917.

The bridge. With the Korean War and the technological competition with the Soviet Union, pressure was applied to field new weapon systems in minimum time. The acquisition community could not meet this challenge of time compression because ARDC and AMC were experiencing delays caused by the increased need for coordination in weapon system development (72:10). These continuing delays led to the development of the Weapons System Project Office (WSPO) in 1954. These offices, staffed by representatives from both ARDC and AMC were charged with the management of the transfer of responsibility between R&D and production of one weapon system. The WSPO concept was used successfully for the development of the B-47 and B-52 weapon systems (3:14-15, 17).

The WSPO success can be attributed to both commands being concerned with the transfer problem. This management approach eliminated the lengthy coordination delays between

organizations (57:312-313). The WSPO was an attempt to alleviate the transfer of responsibility problem initially identified by the U.S. Signal Corps in 1917.

Concurrency Arrives

During this time period (1950s) the technological race continued and intensified. The United States perceived that the Soviet Union was further advanced towards the development of operational ICBMs than itself (72:9-12). This threat to our national security led to a change in the acquisition structure. Up until that time new weapons were developed, as was related, by using the prototype concept. In order to develop American ICBMs in minimum time, the Ballistic Missile Division (BMD) of ARDC was given the authority and funding to develop ICBM capability with the least possible delay. BMD was given

> . . . a 'packaged' set of procedures so they [BMD] would do all the planning, programming, and budgeting and that only secretarial review would be required thereby cutting out all intermediate staff review [3:21].

BMD was successful in developing missiles under these packaged procedures.

Because of the success of the BMD in developing the Atlas and Thor missiles and the prevailing climate to produce weapons quickly, the WSPO was no longer a viable

concept. The commander of ARDC moved to implement this successful concept to the remainder of ARDC. To accomplish this, however, AMC would have to entirely give up its responsibility for procurement and production for new weapon systems.

The orbiting of SPUTNIK I by the Soviet Union in October 1957 caused the Chief of Staff of USAF to question the R&D process. Two separate studies were commissioned. The first, conducted by the Scientific Advisory Board recommended that R&D be given the procurement and production functions of AMC. The second, called the Weapons System Management Study Group, recommended:

> . . . a Weapons Acquisition Command, responsible for research-development, procurement, and production should be created by 1960 by extracting procurement and production from AMC [3:20-30].

Fourth Iteration--Reorganization

In March 1961, two new commands were born, the Air Force Systems Command (AFSC), and the Air Force Logistics Command (AFLC). The AFSC would, in addition to R&D, assume the function of procurement and production. The AFLC would concern itself with supply and maintenance activities.

LCC Becomes Important

LCC considerations were not of importance until the middle 1960s. Until that point, AFSC was reasonably

successful in developing new weapons using the concurrency concept and with ample financial backing from Congress due to the Soviet threat. However, by 1968 the O&S portion of the total cost of weapons systems exceeded 50 percent (11; 58:7). Besides new weapon systems becoming too costly to support, they were becoming exceedingly complex to maintain in the field (23:6).

AFLC's Reaction to Environmental Change

In May 1973, the Air Force Auditor General (AFAG) responding to a concern voiced by Air Staff, reported to AFLC that "Hq AFLC was not properly organized to support acquisition programs [74:15]." AFAG recommended that AFLC establish a separate organization, preferably at DCS level, within the headquarters, "to direct and coordinate all of the acquisition support programs within the command [74:15]." This report criticized AFLC's lack of control as evidenced by the rapidly rising O&S costs that the Air Force was experiencing.

Basically, AFAG suggested the organization have sufficient authority to direct and coordinate logistics support throughout AFLC and that AFLC become participants in the acquisition system (63:2).

> Traditionally, R&D has been concerned with performance, cost of acquisition and schedule, while the support/operating communities are concerned with maintainability, availability, and operating and support costs. Managers of systems and their contractors were judged on how well their systems met a required operational capability (ROC) performance, the relationship of actual to predicted costs (acquisition costs), and how close the actual operational date came to meeting the date specified in the ROC. In this environment, support considerations were either ignored or took a relatively unimportant place in the system manager's deliberations. As a result, logistics support considerations were delayed beyond the point in the life cycle of the system at which logistics expertise could make a contribution to decreased life cycle costs and improved readiness. When designed-in support deficiencies are finally uncovered, too many expensive corrective modifications are required. Maintenance costs soar [68:4].

AFLC's Reaction: Another Bridge

In order to solve the problem identified by the AFAG, AFLC would have to take a more positive role in systems acquisition. To accomplish this end, General Jack J. Catton, Commander AFLC (AFLC/CC), tasked Major General Robert E. Hails, then Commander Warner-Robins Air Material Area (WRAMA/CC), to study the situation and give positive recommendations for change. This study resulted in the formation of the Deputy Chief of Staff for Acquisition Logistics (AFLC/AQ), in April 1974. This positive reaction to the recommendations of AFAG, by AFLC, was an early indication of AFLC's willingness to assume new

responsibilities in areas not previously encountered (74:15). This new organization incorporated into its structure the Deputy Program Managers for Logistics (DPML) that had existed for some time. The DPML was:

> . . . responsible for insuring that all logistical aspects relative to the weapon system receive the necessary attention for development and accomplishment during the weapon system life cycle [58:II-3].

The DPMLs were located at each SPO and represented AFLC's interests in the design of the new weapon. The DPML was an AFLC Major or Lieutenant Colonel who assisted the SPO in developing the Integrated Logistics Support Plan (ILSP) which detailed all the logistics considerations being designed into the weapon (58:II-2). Under that concept the DPML was also assigned as the System Manager of the weapon system and would transition from the SPO to the ALC assigned for System Management at PMRT. The DPML network was a formal agreement between AFLC and AFSC that recognized the logistics considerations of new weapon system acquisition. And, by integrating the DPMLs into AFLC/AQ, the acquisition community was alerted to AFLC's rising concern over skyrocketing O&S costs (6:35-40; 8).

However, AFLC/AQ was less than completely successful because of their lack of control over the commitment of R&D and Procurement funds in new weapon system acquisition.

Also, AFLC/AQ had no way of motivating the Program Manager (PM), since the PM's OER was determined on how well he could meet his ROC. Therefore, his decisions were influenced by this reward/punishment continuum (16; 21: 175-182). And, since the Deputy Chief of Staff for Acquisition Logistics was not a commander and not equal in rank to the AFSC product division commanders, his influence on AFSC was less than optimal. As the last AFLC/AQ, Brigadier General George R. Rutter, has stated:

> . . . the contractor is responsive to the organization that controls the pursestrings and that the only way the Air Force was going to get the proper response from the contractor . . . would be to have financial aspects of the acquisition program for production handled by Air Force Logistics Command whose interest was in Logistics and Logistics support . . . you really need more resources and horsepower in the activity working as the advocate for downstream support. . . . It's primarily a matter of emphasis, attention and visability . . . [54].

Because of this admitted lack of AQ success, "continued high operating costs in the face of a tighter fiscal atmosphere led to additional studies to find a solution [74:18]."

Two Studies

In July 1975, General David C. Jones, Air Force Chief of Staff (AF/CC), called Lieutenant General Joseph R. DeLuca, former DCS Systems and Logistics

(AF/LG), to head a study called Systems and Resources Management Action Group (SRMAG). This study was to propose improvements in Air Force management in a number of areas. The SRMAG produced 37 management proposals, of which number seven proved to be the genesis of the AFALD. Proposal number seven was concerned with the improvement of Air Force leadership and performance in the areas of Procurement, Production and Contract Administration. The SRMAG provided 20 justifications for this proposal. Among these were: lack of professional competence in the acquisition area; lack of organizational interactions within the acquisition community; and the need for

> . . . improving mechanisms for transfusions of lessons learned across contracts of major programs, institutionalizing, and assuring corporate memory and its use [15].

General DeLuca had five possible alternatives for implementing proposal number seven. They were:

1. Strengthen the procurement role of the LG at Air Staff level.

2. Transfer the procurement function from LG to R&D at the Air Staff (AF/RD).

3. Create an Air Force Procurement Evaluation Center.

4. Create an Assistant Chief of Staff for Procurement and Production.

5. Create an Air Force Procurement Management Agency [15].

He recommended alternative number five because of its expediency and ease of implementation (15).

Concurrently with the SRMAG study, but unknown to them, General Jones commissioned a separate study to be headed by Lieutenant General Robert E. Hails AF/LG. This second study was to concentrate its efforts on the improvement of the procurement function within the Air Force, and to make specific recommendations. General Hails stated:

> . . . I believe the genesis of our problems is perhaps more the result of the loss of competent procurement personnel—coupled with a loss in corporate memory—rather than existing organizational relationships [25].

Another factor emphasized by General Hails was that the SPOs were primarily concerned with their traditional responsibilities: performance, schedule and acquisition costs of new systems, and that they were too busy defending their own programs to become familiar with the details of logistics support (25).

General Hails' study was completed and submitted in September 1975; the SRMAG study was completed three months later. On completion of both studies, General Jones requested that General Hails assess these studies and report his findings to AF/CC. On 25 February 1976, General Hails concluded that the SRMAG proposal was "only the tip

of the iceburg" and that the real problem concerned the break point, i.e., the responsibility transfer point. In order to rectify this problem, he recommended the creation of an Air Force Systems Acquisition Center (AFSAC) to be located at Wright-Patterson AFB, under the jurisdiction of AFLC. Under this proposal AFSAC would assume the responsibility for production and procurement at DSARC III. In order to assure the smooth transition, he further recommended realignment of existing resources of AFSC and AFLC rather than acquiring additional resources. He felt that his proposed realignment would cure the defects noted in the unsatisfactory performance of AFLC/AQ. These defects were AFLC's attempts to solve the O&S problem without proper management authority (26).

On 28 February 1976, Assistant SecDef Clements noted in a memo to the Military Department heads his rising concern over O&S cost growth. He said:

> . . . I am seriously concerned with the continuing growth of the fraction of the total DOD resources needed to operate and support our weapons and the decline in funds for new weapon procurement. . . . I am equally concerned that insufficient attention is being paid to controlling eventual system O&S costs during conceptual, validation and full-scale development phases of new systems. . . . I am requesting that each service establish O&S targets for each system in development to support the above objectives and follow up on the achievement of such targets . . . [11].

He requested that each Military Department provide to him within 90 days, their planned approach to address the problem (8). Upon request of General Jones, selected field commanders and Air Staff deputies submitted their views on General Hails' 25 February study. While they all agreed on the necessity of positive and expedient action, there was substantial disagreement on the amount and kind of actions necessary. Basically, General Evans AFSC/CC, Lt. General Marsh AFSC/CV, and General Slay AF/RD felt that there was no need for a new organization, while General Rogers AFLC/CC, General Nunn AF/IG, and General Hails AF/LG stated their support for the proposed organization (7; 19; 27; 41; 44; 52; 59).

It is interesting to note General Evans statement to General Jones on 23 March 1976, where he disagreed with the proposed new organization. General Evans felt that with better support and expertise from AFLC's DPMLs that AFSC could stem the growth of O&S costs. However, AFSC's existing published guidelines (AFSC Pamphlet 800-3) stated in part:

> The DPMLs do not interfere with AFSC command channels, and do not issue logistics policy . . ., and will respond when called upon [73:p.20-14].

CSAF Reaction: A Bigger Bridge

By the end of March a consolidated position was reached between the Air Staff and field commanders. General Jones requested that the Secretary of the Air Force (SAF) approve the development and implementation of the Air Force Acquisition Logistics Division. The proposal included a Lieutenant General as commander so as to give increased weight to logistics considerations in new weapon systems acquisition. By early April, positive indications were received unofficially by AFLC staff and Brigadier General George R. Rutter AFLC/AQ initiated planning to develop the new organization. On 9 May 1976 official approval was received to begin full-scale development and a Steering Group and Working Group were formed. By that time there were only 54 days left to meet the 1 July deadline stipulated by the Air Force, so therefore, acceleration of planning effort ensued (13; 35).

Guidance was provided to the Steering and Working Groups by Lieutenant General George E. Rhodes, Vice Commander of AFLC. His guidance consisted of eight major areas but he emphasized that the new organization should be recognizable to staff from either AFLC or AFSC. The AFALD,

> . . . represented a middle ground between a normal AFLC and AFSC organization, hopefully where either command level could identify their counterparts in AFALD [35].

As a part of the planning effort the Working Group felt that a close physical proximity to ASD would emphasize to AFSC AFLC's determination to successfully advocate logistics support in new system acquisition. It was for this reason that the ASD vice-commander was advised that Building 15 (one of ASD's) would be occupied by AFLC personnel on 1 July 1976, thereby displacing three general officers and their staffs. The justification for this action was that it had "a greater emotional and symbolic feel than practical value [74:43-44]."

Wise Old Turk

AFALD is the latest iteration in a series of attempts to answer the problem of transfer responsibility between the various members of the acquisition community. Would it be more beneficial to have one organization responsible for the entire acquisition process or have several organizations split the responsibility at some pre-determined point? The U.S. Army Signal Corps was split between R&D and Production and Support. The AMC was responsible for the entire acquisition process. ARDC and AMC split in the same place as the U.S. Army Signal Corps.

AFSC and AFLC split management with AFSC responsible for the entire process with the exception of Maintenance and Support. All throughout this process, the solution to the problem was to build an organizational bridge between the disparate members of the acquisition and support structure in order to insure a smooth continuity of responsibility transfer.

AFALD is the current iteration in a long series of organizational readjustments.

> Of one thing there should be no doubt: the establishment of the AFALD emphasizes Air Force determination, from the Chief of Staff to the man on the line, to cut the costs of owning and operating weapons. The reason is clear: failure to do so will deny us the dollars needed to develop and acquire weapons desperately needed for national security [48:79].

It should be remembered as a wise old Turk once said, "There are no new problems, only new players!"

Chapter 4

FORMAL ORGANIZATION

Introduction

The acquisition structure within the United States Air Force has been changed significantly in recent years. As narrated in Chapter 3, the changes in structure have been caused by changes in the prevailing acquisition philosophy and environment. The conceptual framework for the AFALD is not new but is a logical outgrowth of the factors of changing environment and acquisition philosophy. There would have been no need for AFALD if there had not been a tremendous cost growth in new weapon systems; with an increasing share of this cost being allocated to weapon system support along with the fixes for designed-in problems, i.e., weapon system modifications. However, cooperation has been possible between the R&D community and the logistics community when it has been mutually beneficial to both. For example, the WSPO organization was supported by both ARDC and AMC for their mutual benefit (3:14-17).

As previously stated, AFALD is the latest attempt to integrate the R&D and support elements of the acquisition process into a coherent whole. In order to answer

the research questions concerned with AFALD's role in the acquisition community, it is necessary to examine its mission and structure. To obtain these answers, the first section of this chapter is a statement of AFALD's published goals and objectives. The reason for this enumeration is to provide a baseline for comparison between its stated goals and objectives and accomplishments which will be discussed in Chapter 5.

The second section of this chapter is an examination of the major units of AFALD. The organizations selected for this examination are:

1. Deputy for Acquisition Programs (AFALD/SD)
2. Deputy for Readiness Development (AFALD/AQ)
3. Deputy for Product Evaluation, Engineering & Test (AFALD/PT)
4. Deputy for KC-10 (AFALD/YT)
5. Deputy for Acquisition and Analysis (AFALD/XR)
6. Deputy for Procurement and Production (AFALD/PP)
7. Productivity, Reliability, Availability, and Maintainability Office (PRAM) (ASD/RA).

This section includes a description of each organization's mission, structure, and interfaces.

Mission: The Macro View

> The mission of the Air Force Acquisition Logistics Division is to participate in the acquisition of aerospace systems/equipment (for the AF, DOD and FMS) to optimize their availability, supportability, and readiness while minimizing life cycle cost [61:p.1-1].

The goals and objectives of AFALD, as issued by CSAF, and developed by the AFLC Steering and Working Groups are as follows:

1. Insure the accomplishment of improved, earlier support planning for aeronautical systems.

2. Identify actions and requirements necessary to increase availability and readiness of operational systems.

3. Identify and foster methods for reducing operating/support costs of aeronautical systems.

4. Develop and execute optimum systems/support procurement methodology across and within AFLC/AFSC boundaries.

5. Maximize effectiveness of business strategy planning by applying it across total systems acquisition.

6. Determine optimum method for contract administration of total system/support spectrum.

7. Encourage and facilitate transfer of product support knowledge and skilled personnel between the AFLC ALCs and the system development activities.

8. Clarify interfaces and consolidate activities both internal and external to the Command [62].

The first organization of AFALD (Figure 3) consisted of five major deputates. Its original configuration was determined by the need for both AFLC and AFSC organizations

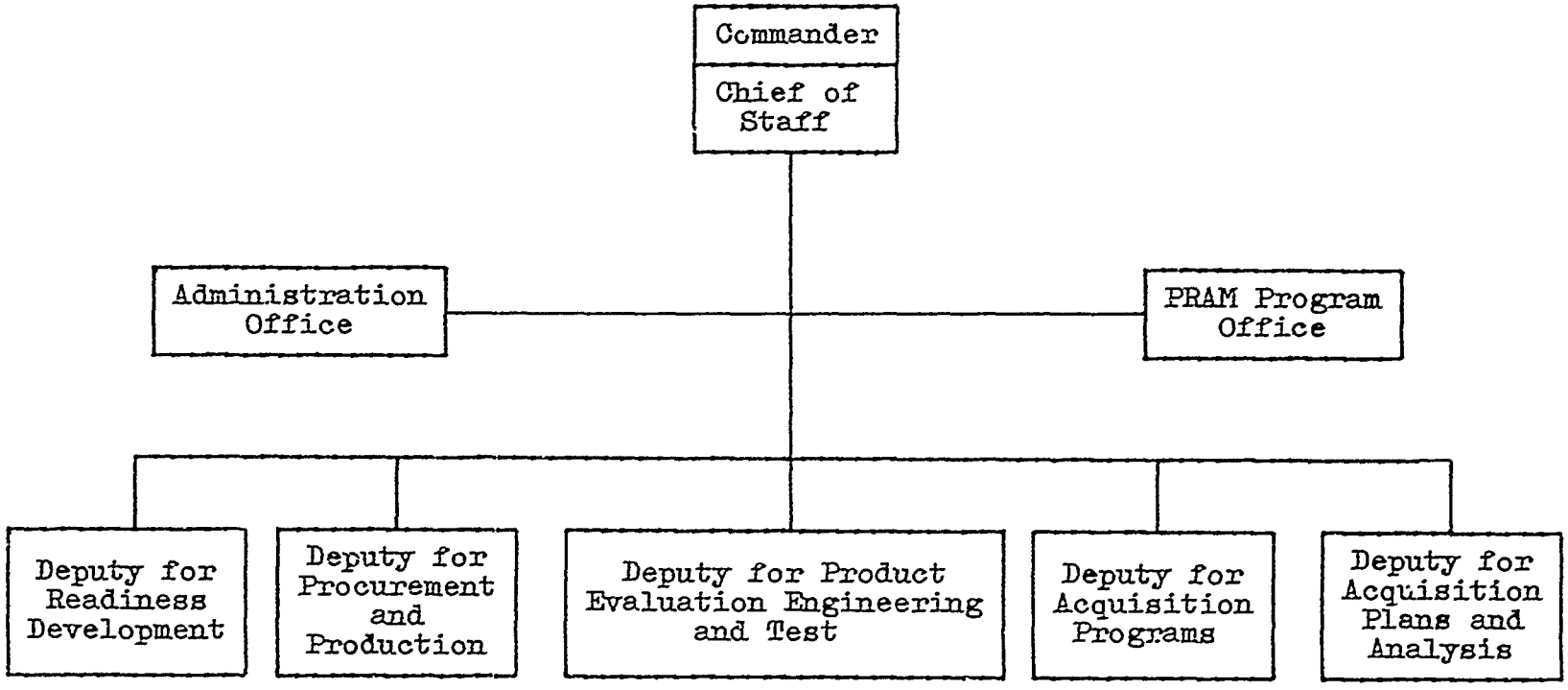

Figure 3

AFALD Organization As Of 1 July 1976[1]

[1]Adapted from AFALD Organizational Directory of 1 July 1976 (74).

to be able to locate a counterpart within AFALD. Therefore, AFALD was not structured as a replication of either but as a hybrid combining elements of each. Its human resources, for the most part, came from the old AFLC/AQ, the jointly manned PRAM office, the existing DPML network at the SPOs, and elements from a number of Headquarters (HQ) AFLC organizations (63:35-36,39).

By October 1976 (Figure 4) AFALD was changed materially by the addition of two new organizations: (1) The Deputy for Tanker Cargo Aircraft (AFALD/YT) from ASD, and (2) The Deputy for International Logistics (AFALD/MI) from HQ AFLC.

The Deputy for International Logistics was added to the organizational structure of AFALD for two reasons: first, International Logistics (AFLC/MI) had evolved into an operational activity that was not functionally compatible with the normal staff functions of policy being performed by HQ AFLC; and second, HQ AFLC was seeking relief from a manpower ceiling (51). The reasons for the addition of the KC-10 SPO will be discussed during the examination of that deputate.

By June 1978, AFALD/MI was returned to the management of HQ AFLC (Figure 5). The realignment was caused by the increasing magnitude of Foreign Military Sales (FMS)

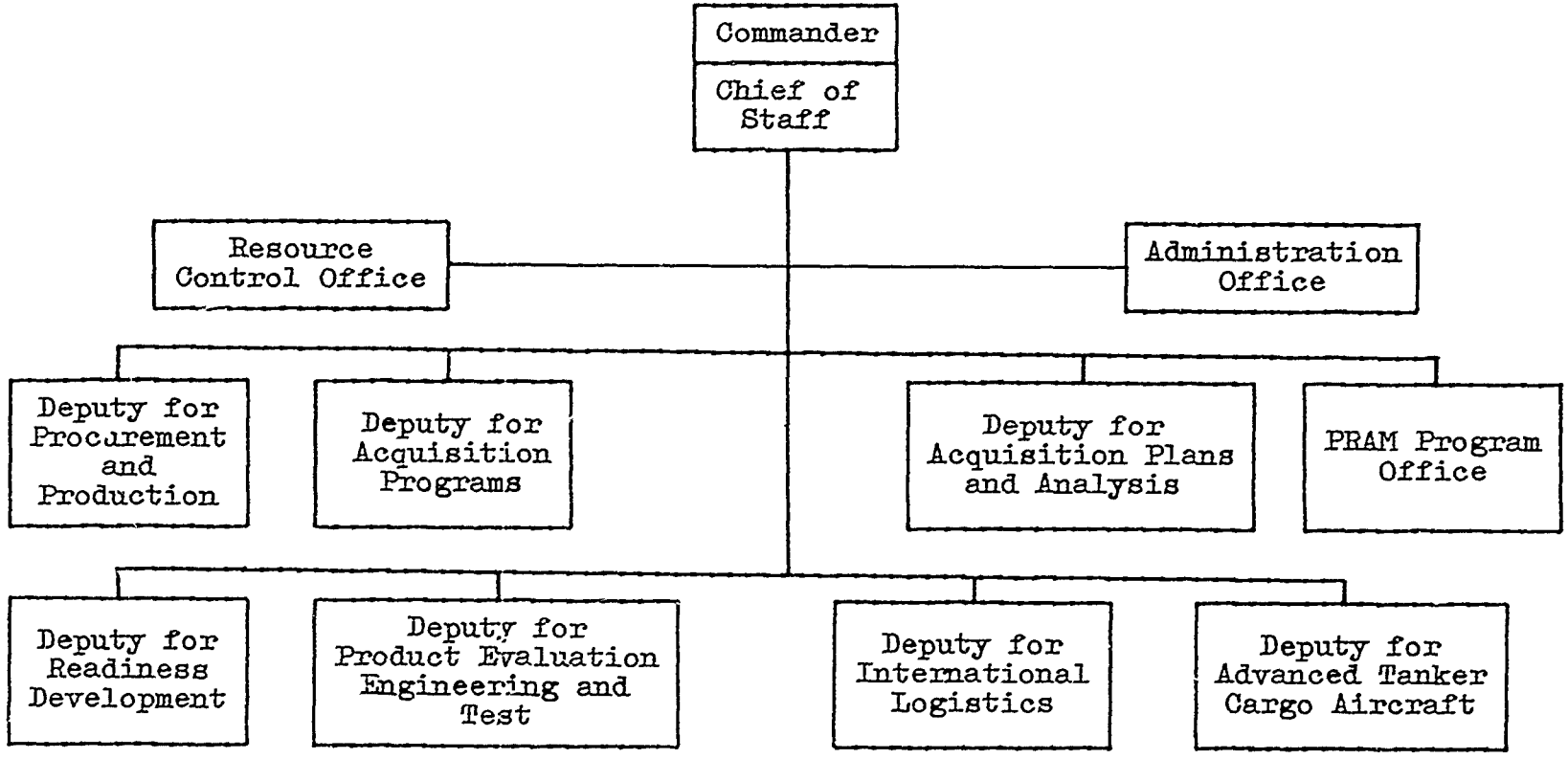

Figure 4

AFALD Organization As Of 8 September 1977 [1]

[1]Adapted from AFALD Organization Chart of AFLCR 23-17 (61:pp.A1-1).

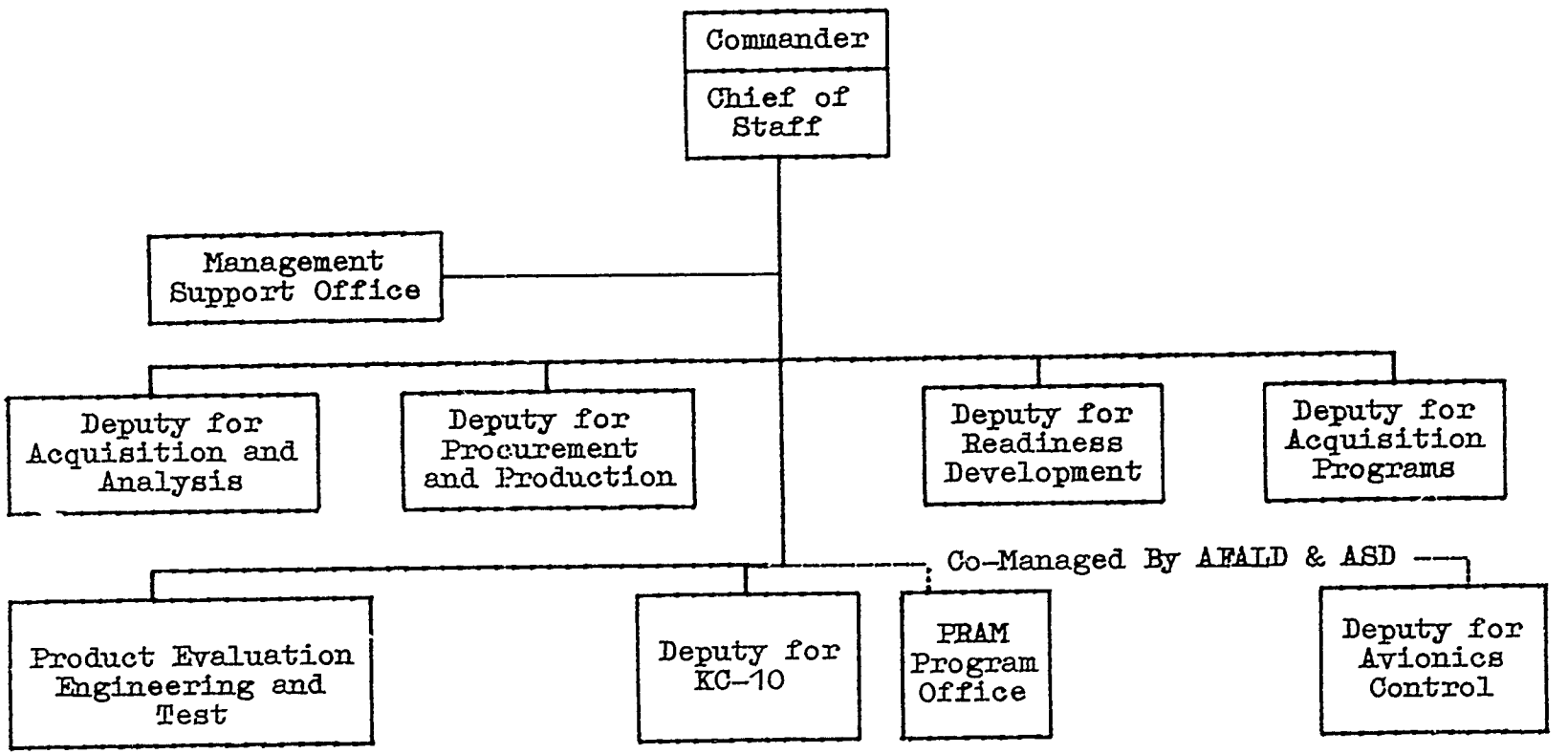

Figure 5

AFALD Organization As Of 1 June 1978[1]

[1]Adapted from AFALD Organization Directory of 1 June 1978.

by the Air Force to friendly foreign nations and the necessity for close coordination of all FMS activities. AFLC/MI became the operational deputate for the newly formed International Logistics Center (ILC) (9). In the same timeframe an additional deputy was added to AFALD. The Deputy for Avionics Control was formed to manage avionics of Air Force weapon systems. This new deputate was manned jointly by AFALD and ASD (64).

AFALD: The Micro View

To see how AFALD is structured to physically interface with the other members of the acquisition community, this section is a description of all of the principal deputies of AFALD with an addition of the PRAM office. The new Deputy for Avionics Control (AFALD/AX) will not be discussed because of its very recent creation.

Deputy for Acquisition Programs (AFALD/SD). AFALD/SD mission:

> . . . provides logistics expertise and resources to assigned major weapon system, engine and equipment programs during validation, full-scale development, production, and initial operational phases [61:p.6-1].

This is the AFALD organization that integrates AFLC efforts at AFSC locations in support of major programs. Note that the term major programs has been used in the description of

the duties of the Deputy for Acquisition Programs. This term, "major programs", is defined by DODI 5000.1 and states that a major program is one where over $75 million in R&D money is expended or over $350 million is spent in production of a new weapons system (77:2). This deputate consists of:

ASD DPMLs
ESD DPMLs
SAMSO DPMLs
ADTC DPMLs
HQ USAF DPML
Directorate of Systems Programs
Directorate of Propulsion Logistics (33; 61).

The major thrust of AFALD/SD is its interface with the SPOs located at the product divisions of AFSC. This interface is embodied in the form of a Deputy Program Manager for Logistics (DPML) co-located with the major weapon system SPO. For example, the DPML for E-4 is co-located with the SPO for E-4 located at ESD, Hanscom AFB, MA. The DPML acts as the spokesman for AFLC with full authority and primary responsibility for planning, coordinating and directing all AFLC integrated logistics support and logistics management activities (61:p.6-1). As such the DPML (leader) or DPML (organization) is responsible for developing the Integrated Logistics Support Plan (ILSP) which considers all logistics support aspects of a new weapons system for development by the prime and sub-contractors. The DPML has the responsibility to ensure

that LCC considerations are written into the contract and that the contract language is written so as to incentivize the contractor to produce a system that has a minimum O&S cost (48:74-75; 50:20; 80:18-20).

The Directorate of Systems Programs (SDM) is responsible for support of the DPML operation and as such maintains a close working relationship with them. Specifically, SDM independently assesses each DPMLs LLSP to ensure continuity of AFALD's overall mission. One of the most important duties of SDM is to arrange and support both Decision Coordinating Papers (DCP) and Program Assessment Reviews (PAR). The DCP is the formal proposal sent to the DSARC to advance the program to the next milestone. The PAR is a formal agreement between AFALD and the product divisions of AFSC to address disagreements at a lower level. These reviews are held quarterly on each major program and problems that are unable to be solved at a lower level are resolved by the Commander of AFALD and the commander of the product divisions (45; 61). The final major responsibility of SDM is to ensure an orderly and smooth transition from control of the program by the SPO to the system manager (SM) at the Air Logistics Center (ALC) at Program Management Responsibility Transfer (PMRT). In the past such transitions have experienced the transfer of weapon systems with

supportability problems from the SPO to an ALC, or as General Rogers (past commander AFLC) once said, "The R&D community is like Pontius Pilate: washed its hands . . . when it turns it over [at] PMRT [53]."

The Directorate of Propulsion Logistics (SDD) is the AFALD focal point for logistics assessment of all propulsion systems. It analyzes proposed systems for supportability, provides input to studies on engine logistics and in general ensures that new propulsion systems meet their technical requirements with an effective O&S cost (33; 61).

Deputy for Readiness Development (AFALD/AQ). The Deputy for Readiness Development is the primary AFALD interface for logistics considerations in less-than-major acquisition programs. As such AQ has a responsibility to provide the same assistance to the less-than-major (LTM) system SPOs that the DPMLs provide for the major system SPOs. Each Integrated Logistics Support Office (ILSO) (organization) and Integrated Logistics Support Officer (personnel) acts to provide logistics planning assistance to the LTM SPOs or mini-SPOs (22; 61). The directorates are:

Directorate of Equipment Support

Directorate of Armament Logistics

Directorate of Electronic Logistics

Directorate of Aerospace Logistics

Directorate of Logistics Integration (22; 61).

At Wright-Patterson AFB,ASD interfaces with AFALD's Directorate of Equipment Support (AQP). This organization houses the ILSOs that support the mini-SPOs at ASD. This support may take on the full time attention of one or more logisticians or one ILSO may support several small acquisition programs. If the program is large enough for an AQP organization to support it full time, then the senior logistician is designated the DPML/ILSO and the ILSOs report to him. At ASD one SPO is an aggregation of a number of small programs that pertain to the acquisition of airborne electronic systems. This SPO, known as a "basket-SPO", contains enough programs to qualify as a major system SPO if the dollar amounts of each program were added together. Thus, AQ has designated the senior ILSO who works with this basket-SPO as a DPML (22; 31; 61). Therefore, SD does not contain all the DPMLs, at least one is the responsibility of AQ.

The Directorate of Armament Logistics (AQD) is co-located at Eglin AFB with the Armament Development Test Center (ADTC). AQD also supports the operations of the Air Force Civil Engineering Center (AFCEC) at Tyndall AFB,

FL as well as the Naval Weapons Center (NWC) at China Lake, CA (61:p.5-2). ADTC is responsible for developing and testing conventional ordnance and munition aircraft carriage equipment (71:1-2). AQD provides the logistics expertise that is necessary to develop logistically supportable ordnance at a supportable O&S cost. They also provide "onsite assistance and test team participation as directed . . . [61:p.5-3]."

The Directorate of Armament Logistics, as of this writing, is being integrated into the organization of ADTC along with the existing logistics organization that preceeded the development of AQD. This matrixed organization will come under the management responsibility of ADTC but will be manned by each, with a corresponding manpower saving to both AQD and ADTC (22; 61).

The Directorate of Electronic Logistics (AQE) supports the LTM SPOs at ESD located at Hanscome AFB, MA. In the same way the Directorate of Aerospace Logistics (AQS) supports the operations of SAMSO at Los Angeles AFB, CA (61:p.5-2).

The Directorate of Logistics Integration (AQI) located at HQ AFALD, provides additional support to the field directorates of AQP, AQD, AQE, and AQS. Their support consists of reviewing ILSPs to insure standardization of effort. When requested by a field directorate

they assist in preparation of the ILSP and provide additional analysis support. AQI also serves as the focal point for all interested parties in the acquisition of LTM programs. That is, the ALC that is responsible for the acceptance of a new minor electronic system finds in AQI a point of contact for the status of the program. AQI is also the organization with overall visibility of the program and a point of resolution for the ALC's supportability problems (22; 61).

Deputy for Product Evaluation, Engineering and Test (AFALD/PT). This deputate's structure "was designed to provide program managers feedback on lessons-learned from past and current operating systems and items [69:16]." This directorate

> . . . serves as the AFALD corporate memory for lessons learned; designs and operates a repository of technical data and provides feedback to AFSC on prior identified design and product deficiencies [61:p.4-1].

It is the direct liaison among the technical and research community, the AFALD activities that are impacting the design of new weapon system, and the users of the new weapon system (4; 61). The units within AFALD/PT are:

USAF Engineering Data Support Center

Directorate of Engineering Services

Air Force Packaging Agency

Directorate of Product Performance Evaluation

Test Plans Office

Directorate of Flight Test Evaluation (4; 61).

The USAF Engineering Data Support Center (PTD) transferred from the 2763rd Support Squadron under AFLC to AFALD on 1 July 1976. This organization is the central depository for engineering drawings on USAF weapon systems. PTD supports contractors with engineering data on Government Furnished Aerospace Equipment (GFAE). The working sets of blueprints are located at the ALC which has engineering responsibility for each Air Force weapon system. PTD also supports other USAF organizations, DOD organizations, and civilian agencies (4; 61:p.4-4; 70:18).

The Directorate of Engineering Services (PTE) is the AFALD interface with the engineering organizations of AFSC. PTE rotates engineers from AFSC to AFALD in order to facilitate transfer of product support knowledge.

> It promotes a greater availability of service engineering experience and facilitates responsiveness to the requirements of the development community [69:20].

PTE provides an interface from the engineering of the product division and laboratories of AFSC indirectly to the DPMLs for use on new acquisition initiatives (61:pp.4-1 to 4-2; 70:20).

The Air Force Packaging Evaluation Agency (PTP) was also incorporated into AFALD from HQ AFLC on 1 July 1976. PTP has a dual responsibility. Its first responsibility is to improve the packaging of aerospace spares and equipment in order to lessen breakage and enhance availability. Its second primary responsibility is to develop appropriate packaging methods for new weapon systems through its interface with the SPO and DPML (4; 61).

The Directorate of Product Performance Evaluation (PTQ) is the AFALD organization that collects engineering data at the operating location, integrates that data with respect to its effect on reliability and feeds the analyzed data back to SPOs and DPMLs in the form of lessons learned. Its mission is the development, maintenance, and application or dissemination of a corporate memory bank. PTQ also liaisons with the other military services organic depot maintenance activities in order to develop plans for Depot Maintenance Interservice Support Agreements (DMISA) as well as to avoid duplication of capital facilities (4; 61:p.4-2; 76; 80:21-22).

The Test Plans Office (PTX) ensures that the appropriate data are collected during the test of the new weapon system. These data will aid in procuring the proper spares to logistically support the system during its life. So,

therefore, any material change to a weapon system must be accounted for in the test so that the new configuration is supportable (4; 61).

The Directorate of Flight Test Evaluation (PTF) is the AFALD focal point for logistics supportability evaluations. This is accomplished through their interface with Air Force Flight Test Center (AFFTC) located at Edwards AFB, CA. They also work with Air Force Test and Evaluation Center (AFTEC) at Kirtland AFB, NM. PTF's major responsibility is to ensure that previous test experience in logistics supportability evaluations is integrated into the current test program. It is manned jointly by permanent staff of PTF as well as representatives from the gaining Air Logistics Center (ALC). The experience gained during the test program is carried back to the ALC by its representatives; and the permanent cadre of AFALD uses this current test experience to enhance future test programs (4; 51:p.4-3; 66:1-2; 67:1).

Deputy for KC-10 (AFALD/YT). The Deputy for KC-10 was previously known as the Deputy for Advanced Tanker/Cargo Aircraft (ATCA) and was part of the ASD organization. On 1 October 1976 ATCA transitioned from ASD to AFALD which marked the first time that a Logistics Command organization assumed responsibility for a major acquisition program.

This shift in responsibility was caused by several factors. The first factor was Lt General Robert E. Hails' (AF/LG) belief that inasmuch as the ATCA was to be an off-the-shelf procurement with little R&D then the management by AFALD was appropriate. Secondly, he felt that the managerial talents of AFALD were best suited to the procurement of the ATCA because of its corporate mission in driving down O&S and LCC costs. This advice influenced General David C. Jones (CSAF) to direct the transfer management responsibility from ASD to AFALD (28; 60; 74:69-70).

AFALD/YT is currently a jointly manned Joint Program Office (JPO) managed by AFALD. As such it is configured as a SPO, but it is an AFALD organization. The JPO is a semi-autonomous organization that receives administrative support from AFALD. However, since the JPO has expertise in all line activities, its required support from the other line AFALD deputates is minimal (2; 61).

JPO's primary responsibility is to procure an off-the-shelf, wide-bodied commercial airframe as a new generation cargo/tanker. Source selection has been made and the new Air Force KC-10 will be a modified Douglas DC-10. AFALD/YT directorates are:

Directorate of Engineering

Directorate of Program Control

Directorate of Projects

Directorate of Logistics Support

Directorate of Procurement and Manufacturing

Directorate of Test and Evaluation (2; 61).

The Directorate of Engineering (YTE) provides organic engineering support for all engineering development of the KC-10, including military peculiar items (2; 61:pp. 8-1 to 8-2).

The Directorate of Program Control (YTF) is the JPO organization that is assigned responsibility for overall program control, which includes finance, budget submissions, resource management, and reports control (2; 61).

The Directorate of Projects (YTJ) acts as the coordinating activity for the JPO. As such it represents the PM in all dealings and acts as his "alter ego [2]."

The Directorate of Logistics Support (YTL) is the JPO organization that is responsible for all logistics actions necessary to the program. Since there has been no assignment of an ALC/System Manager and since there is no DPML organization assigned to the JPO, then AFALD/YTL assumes all the functions of a DPML, System Manager, and Item Manager. Since the aircraft is to be procured as a totally contractor supported aircraft, the normal ALC functions of System Manager and Item Manager, i.e., modification, depot maintenance, spares support, etc., may not be appropriate.

The Directorate of Procurement and Manufacturing (YTP) is the organization that performs all procurement functions for the JPO. It is also responsible for the function of configuration management. Configuration management is important to the program so that each airframe will have homogeneous equipage, and so, therefore, will perform identically and will posses the identical maintenance concept. This is particularly important to the KC-10 because its maintenance will be performed by the contractor, or by contractor equipped commercial airlines such as TWA or Lufthansa (2; 61).

The Directorate of Test & Evaluation (YTT) is a JPO organization staffed by ASD personnel with aircraft test experience. Since the KC-10 is a unique procurement YTT, along with the Federal Aviation Administration (FAA), is responsible for monitoring the six-month Quality Test Evaluation to be conducted by the contractor. As part of its responsibility it must ensure that logistics supportability data are collected, which is similar to AFALD/PT. Additionally, YTT approves test plans and performs the function of interface with AFTEC, FAA, and the Navy (2; 61).

Deputy for Acquisition and Analysis (AFALD/XR). This Deputate is the AFALD organization responsible for the

integration and consolidation of plans made by other line AFALD organizations and serves as the commander's staff. Its role is to assist as a staff function in the orderly accomplishment of the AFALD line functions operations. It

> . . . develops and applies acquisition concepts, procedures, techniques, and operating policies in support of AFSC and AFLC developmental planning and provisioning activities for USAF [and] inter-service programs [61:p.3-1].

Its directorates are:

Directorate of Acquisition Plans and Management

Directorate of Concepts and Analysis

Directorate of Acquisition Procedures and Guidance (61).

The Directorate of Acquisition Plans and Management (XRX) serves as direct representative for the commander in any assigned role. It also represents AFALD on war plans, mobility, readiness, and attempts to increase the stature of logisticians. By being an advocate of logistics education, and by possessing a close working relationship with the Air Force Institute of Technology (AFIT), and civilian institutions, XRX was instrumental in developing the new logistics management majors of Acquisition Logistics and International Logistics (30; 61).

The Directorate of Concepts and Analysis (XRS) serves AFALD as the organization which performs in-depth Logistics Support Analysis and supports the line organizations with analytical tools and model building. That is,

with the use of a computer, XRS applies mathematical techniques to simulate the "real world" and uses this model to: (1) replicate the past decisions so as to validate the model, and (2) use extensional techniques to predict the future based on current decisions. Therefore, it attempts to widen the managers range of alternative decision options and foster better decision making (30; 61).

The Directorate of Acquisition Procedures and Guidance (XRI) is the XR organization that is attempting to avoid the previous acquisition problem of multiple buys of identical tech data from contractors. This will be accomplished by using a Unified Data Bank to track the acquisition of contractor generated data and feeding this information to the SPO and DPML. XRI also interfaces with AFLC and the ALCs in the area of provisioning, spares, and contractor support (30; 61).

Deputy for Procurement and Production (AFALD/PP). This Deputate is the AFALD organization that studies and provides methods for better procurement policy and procedures. In the past some contract language had the effect of producing a weapon system with a minimum Mean Time Between Failures (MTBF). This had the effect of reducing the availability of the weapon system while driving up the cost to support it. Current contract language rewards the

contractor if he exceeds a specified MTBF and penalizes him if his system falls below this level. The effect of the new strategy is to increase reliability and availability while decreasing O&S costs and hence LCC (24; 61).

AFALD/PP:

> . . . examines existing contractual provisions and develops new ones to insure consideration of total life cycle costs. Alternatives such as warranties, support cost guarantees, design-to-cost and other factors affecting life-cycle costs are reviewed to insure that major systems are easier and cheaper to buy, operate, and maintain [69].

The Directorates of the Deputate for Procurement and Production are:

> Directorate of Procurement Operations and Support
>
> Directorate of Contracts and Planning (61).

Directorate of Procurement Operations & Support (PPA) supports the operations of the procurement activities within the SPOs and DPMLs. It ensures that appropriate contract language is included in Requests for Proposals (RFP) and Invitations for Bids (IFB) thereby directing potential contractors to address logistics considerations in their proposals (61:p.7-1).

The Directorate of Contracts and Planning (PPE) acts as the AFALD focal point for management of contracts for which AFALD has procurement responsibility. PPE also serves to develop new and innovative procurement methods

to support AFALD's mission to drive down O&S cost. This is fulfilled by the Business Strategy function which seeks to integrate new strategy into procurement contractual instruments (61:pp.7-1 to 7-2).

Productivity, Reliability, Availability, and Maintainability Office (PRAM) ASD/RA

> As a combined AFLC/AFSC program, manages (plans, organizes, coordinates and directs) the collective actions of participating organizations in planning and executing independent evaluations of productivity reliability, availability and maintainability programs on current and future Air Force systems, subsystems and equipment and makes recommendations relative to the improvement thereof [61:p.10-1].

PRAM is the AFALD organization that is directly responsible for the enhancement of current USAF weapon systems. This office is jointly manned by AFALD and ASD, but is administratively assigned to ASD. PRAM seeks to reduce the life cycle cost of current operational and in production weapon systems (29). PRAM has representation in the form of field offices at each ALC as well as Aerospace Guidance and Metrology Center. They also have a focal point identified at each of the major commands. Proposed projects for PRAM's consideration are submitted by the ALCs, or other points of contact, reviewed, assessed and then recommended for implementation (29; 61).

Chapter 5

ACCOMPLISHMENTS

Introduction

Of the accomplishments of AFALD, some of them seem to be more important to the fulfillment of their stated goals and objectives than others. Of the accomplishments made known to the authors, those that seem to be of major significance to AFALD are discussed below. This is so because it is beyond the scope of this research effort to discuss the more than 100 published accomplishments (Appendix D) of AFALD (64). It should be realized that some accomplishments contribute to the fulfillment of more than one goal. In the interest of clarity each accomplishment will be discussed once and its contribution to all the goals of AFALD will be stated at that time.

Increased Stature and Importance of DPML

The most important accomplishment of AFALD has been to enhance the importance of the DPMLs at each of the SPOs (64). In the past, before the development of AFALD, the DPMLs existed but had little or no authority or influence (33; 54). However, with the DPMLs placed under the leadership and authority of AFALD, their power and

influence have increased and their impact on acquisition policies has been strongly felt (30; 33).

The DPMLs have been granted the authority to report directly to the Commander of AFALD under the "blue line" reporting procedure. This procedure gives the DPML the right to elevate to general officer level, problems that he feels are important enough to warrant attention and that the DPML feels the PM has not considered (33; 64).

Another example in the increased stature of the DPML is the DPML within the F-16 SPO. He is of equal stature to the PM and assumes the PM's duties in his absence (36; 37). Also, for the selection of the DPML on each major system, each candidate is reviewed and selected by the Commander, AFLC and "approved and certified as being accepted by the Commander AFSC [22]."

Program Assessment Review (PAR). To further assist the DPML in influencing O&S cost considerations, AFALD has established a procedure with the product divisions of AFSC. This procedure, called the PAR, is an existing product division meeting, now attended by the Commander, AFALD. The PAR allows the commander of each product division and the Commander of AFALD to jointly resolve problems elevated to them by their respective SPOs and DPMLs (22; 64).

Secretarial Program Review (SPR). For major acquisition programs,or those with high visability, another procedure has been established. This procedure called the SPR was directed by John J. Martin, Assistant Secretary of the Air Force for Research, Development & Logistics (SAF/AL). The SPR is held for problems beyond the powers of resolution of the commanders involved. The SPR is also used to inform Dr. Martin on program progress and by so doing allow for management inputs. In each case the Program Manager (PM) and DPML make their viewpoints known to their superiors and decisions are made to resolve conflicts. This additional exposure gives the DPML a chance to make his views known to higher levels of Air Force management than was previously afforded him (22; 64). This increased stature of the DPMLs is also shared by the ILSOs which is described below.

Increased Stature and Importance of ILSO

In the same way that the DPML has increased his stature, the ILSOs have been able to increase theirs. For example, at the less-than-major program level AFALD, in cooperation with AFSC, the using commands, and the ALCs have established the Logistics Assessment Review (LAR). This technique parallels the PAR technique in structure but is applied to less-than-major programs.

> This cooperative effort results in a coordinated approach to resolve or avoid logistics support problems during the early stages of selected programs [64].

The LAR process is also used to keep the managers informed of program status and allows for their input (22; 64).

Since the DPMLs and the ILSOs perform identical functions, but at different levels of program activity, their contribution to the overall goals and objectives of AFALD appear to be the same. So, therefore, both the DPMLs and ILSOs increase in stature and influence contribute to the following goals:

1. earlier support planning,
2. increased availability and readiness,
3. reducing O&S costs, and
4. transfer of knowledge.

Interfaces

Some of the accomplishments of AFALD lie in establishing and maintaining interfaces with the other members of the acquisition community. Of these interfaces some are in the areas of DPMLs/ILSOs which will not be re-addressed. The remaining interfaces were described in Chapter 4 as a part of the description of the formal organization of AFALD. The significance of these interfaces will now be discussed.

Laboratory. AFALD, as part of its continuing mission, has established interfaces between its organic engineering and scientific expertise with that of the Air Force Laboratories.

Some of these laboratories are contained in the Wright Aeronautical Laboratories located at Wright-Patterson AFB, OH (39:58-59). These labs, under the control of AFSC, are cooperating with AFALD, the using commands, and the ALCs in applying the labs expertise to resolve logistics support problems (64).

PRAM. PRAM has representation at field offices, as mentioned previously, throughout the USAF. These points of contact forward candidates for Productivity, Reliability, Availability, and Maintainability analysis for existing Air Force weapons systems. As an example,

> . . . sixty-nine projects were completed this year and fifty-three have been identified for implementation . . . [which] reduced life cycle costs and improved force readiness [64].

Test and evaluation (T&E). In the area of test and evaluation, AFALD has established several interfaces with the organizations that test and evaluate new weapons systems. Specifically, in the area of aircraft testing, AFALD is represented during test of the aircraft at Edwards AFB, along with AFTEC, the gaining ALC, and the other AFSC representatives. This co-location of personnel during the test phases helps to ensure that the new aircraft meets both its operational requirements as well as its supportability requirements. Since some of the personnel are

permanent party at Edwards AFB, their experience in testing new aircraft is carried over to the test of subsequent aircraft. For example, the experience learned in testing the F-15 and A-10 was used to develop a new evaluation technique for the test program for the F-16 (5; 45; 47; 64). The ALC personnel gain valuable experience during the test program that will enable them to a better job of support (4).

The previously described interfaces are only examples of some of the interfaces that exist between AFALD and the rest of the acquisition community. These interfaces contribute to the AFALD goals of:

1. earlier support planning,
2. increased availability and readiness,
3. reducing O&S costs,
4. transfer of knowledge, and
5. clarify interfaces, and consolidate activities.

Lessons Learned

In the area of lessons learned several accomplishments have been achieved that are significant. A conference was held with all the operating commands, ALCs, AFSC and AFALD to address the problem of fuel leaks from existing aircraft. Investigations showed that the F-102 and F-106 aircraft had a unique tank bonding process, called Scotchweld, that rendered "these aircraft virtually leak-free [64]." This process was initially considered for incorporation into the F-16 aircraft which was also experiencing

fuel leaks. However, it was determined to be impractical to adopt it to the F-16 at this point in the acquisition process. But, the technique will be considered for any future production aircraft (4; 64).

By investigating the engineering of new weapon systems it was found that different types and thicknesses of hydraulic tubing were installed on E-3A, A-10 and F-16. AFALD engineering staff recommended that a thicker, standard tubing be used in all three aircraft to reduce the leakage problems being experienced by the E-3A. This technique was approved and repair of all future leaks will use this standard tubing. This change had two advantages; common stockage of tubing and larger buys of the tubing at lower cost (4; 64).

The lessons learned concept has been successfully used on the FB-111H, B-52 Tail Warning System, A-10 Inertial Navigation System, Cockpit TV Sensor, KU-Band Radar Test Set, and F-111 Computer Update Program. For each of these programs a tailored package of lessons learned was developed by AFALD so as to capitalize on previous Air Force experience. The application of the lessons learned technique has the effect of reducing the cost of future systems by lessening the amount of engineering necessary to develop solutions to design problems (4; 64).

The lessons learned concept as applied by AFALD seems to be a significant accomplishment that aids in the transfer of knowledge from the using commands and ALCs to the SPOs. It is this transfer of knowledge and information that is capitalized on by the "corporate memory" of AFALD, and leads to material savings by eliminating the duplication of existing knowledge, i.e., "reinventing the wheel". The tailored package concept as used by AFALD/PT makes the efforts of the designers and planners of new systems more effective (4). The application of the concept of "lessons learned" primarily contributes to the AFALD goal of: transfer of knowledge. In addition, it supports the AFALD goals of: (1) earlier support planning, (2) increased availability and readiness, and (3) reduced O&S costs.

Procurement Strategy

In the area of procurement and procurement strategy, much of the accomplishments that are made are not known for some time to come. This is so because the downstream effect of a procurement strategy decision will not be completely known until the aircraft or system that it is applied to is in the operational inventory. This opinion of the researchers is stated so that a mere recitation of AFALD's published procurement achievements does not appear deficient. Within this limitation three specific procurement

accomplishments will be discussed as representatives of procurement's overall accomplishments.

AN/ARC-164 radio. In the procurement of the AN/ARC-164 UHF radio, a unique cost/benefit sharing ratio was developed and included in the contract. This technique rewards the contractor for developing a radio that has a high MTBF. However, if his system does not meet the established target then he suffers a financial loss. The contractor and the government share both the cost savings or loss if either occurs (48:79).

Harassment weapon system. This system is a mini remotely piloted vehicle (RPV) being procured as an expendable strike weapon. The procurement strategy used during the Request For Proposal (RFP) included a Reliability Improvement Warrant (RIW) with mean time between failure guarantees. This guarantee specified an 80 percent reliability over a 10 to 15 year shelf life period. If the system performs below this threshold, the contractor will repair the malfunctioning unit at no cost to the government. If the contractor's reliability exceeds 80 percent, he shares in the benefit with the government (12; 25).

Contractual guarantees. A guarantee was developed by AFALD to incentivize the contractor to design systems that have

a low depot maintenance cost of manpower and material. The strategy is to involve the contractor in planning for support cost early on in the design effort. "This provision is a significant addition to the contractual incentives available for use by the DPML/ILSOs [64]."

The importance of these three procurement accomplishments (AN/ARC-164 radio, RPV, and guarantees), as well as those not discussed, is the fact that the contract language states to the contractor what the USAF wants the contractor to develop and produce. So, therefore, what USAF tells the contractor is what USAF will receive. If the Air Force can develop and use innovative contractual instruments, then our weapon's availability will increase (48; 49; 80). Procurement's accomplishments contribute primarily to: (1) develop and execute optimum procurement methodology, (2) maximize effectiveness of business strategy planning, and (3) determine optimum method of contract administration. Further, they contribute to the goals of: (1) earlier sup[illegible]planning, and (2) foster methods of reducing O&S cost

Unpublished Accomplishment

Some of AFALD's accomplishments are unpublished but are important enough to warrant attention. Of these unpublished accomplishments, the elementary or basic

goal that deals with viability and growth may be the most important. The following is a discussion of that goal attainment.

No organization can exist in a vacuum (57). This means that in our complex society very few organizations have the complete autonomy to carry out their programs without the cooperation or tacit consent of other organizations. Since AFALD does not accomplish its mission alone but has to work through other members of the acquisition community, notably AFSC, then AFALD has to forge interfaces and interorganizational relationships with them (56). And, since AFALD is motivated to achieve its goals through the other members, then its relationships with the community is its primary task (18).

However, in order to achieve its goals, AFALD had to first secure the goal of survival. No organization can achieve its legitimate goals before it first can ensure its viability. This is a three-step process. The steps are: (1) insure survival, (2) creative chaos, (3) apply experience learned (17:41).

The first stage in AFALD's process was to survive. During the conceptualization of AFALD there was some question as to the suitability and placement of AFALD within the acquisition community. As Lt General Robert T. Marsh, AFSC/CV stated in his letter of 3 April 1976:

> We are particularly distressed with the fact that the proposed letter and plan [AFALD] seem to carry a strong implication that Systems Command is not attuned to the operating and support (O&S) costs aspects of systems under development . . . we strongly object to that flavor . . . . It is totally inappropriate for this task [O&S cost considerations] to be assumed by the new Division [AFALD] [41].

And, as General William J. Evans, Commander AFSC, stated: "I am convinced that adopting General Hails proposal [creation of AFALD] . . . would be a step backwards . . . [19]." In order to explain AFALD's mission to the acquisition community, Lt General Bryce Poe II, Commander AFALD, gave several speeches and interviews to the media during this timeframe (48; 49; 50; 80).

The second stage is characterized with a period of "Creative Chaos [17:41]." It is in this period that the AFALD organization had to operationalize specific objectives from the goals of AFALD. During this learning process AFALD was forging tools and techniques in order to apply them later (55).

The third stage is a period of consolidation where the tools and techniques developed during the second stage are applied to real world problems (17:41). It appears to the researchers that AFALD is finished with the second stage.

The previous discussion was made to acquaint the reader with the very important, but many times overlooked,

acccmplishment of viability. AFALD has entered the third stage of development where trust with other members of the acquisition community has been established (22; 30; 33). There is evidence to suggest that AFALD no longer must consume a portion of its energy in maintaining itself. And, without achieving this accomplishment, AFALD would have been unable to interact with the acquisition community, and by so doing meet its other stated goals.

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The previous chapter was a discussion of AFALD's accomplishments since its inception in 1976. The critical reader may discern that for an organization of the size and complexity of AFALD, and for the length of time that it has been in existence, over two years, that its list of accomplishments should be more significant. For an ordinary Air Force organization this could be true. However, AFALD's future accomplishment, that of decreasing LCC, will probably take a longer period of time to be realized.

The primary mission of AFALD is to, "improve the reliability and maintainability--and thereby reduce the cost of operating--our weapons [50:23]." And, as previously discussed in Chapter 2, about 70 percent of the O&S costs for the life of the weapon are essentially determined during the conceptual stages of equipment development (23:7). Therefore, in order to realize this goal AFALD will have to influence the design of a new weapons system from conception through the deployment/support phase of the acquisition process. Until an aircraft is operational and has had the benefit of AFALD's contribution to its design, any

assessment of AFALD's primary goal may be hasty. AFALD is much like a SPO in this matter. The SPO organization in the midst of R&D for a new aircraft would not be judged a success or failure. In the same way AFALD's success or failure is impossible to predict at the present time, and premature judgements are inadvisable (21; 64).

Interfaces and Influence

"The cutting edge of the AFALD mission rests with our (DPMLs) . . . [64]." This statement illuminates AFALD's reliance on its field organizations to influence each SPO to consider LCC throughout the acquisition process. Therefore, HQ AFALD exists to support its "front line" organizations (33). And, those DPMLs/ILSOs exist to interface with the SPOs. As previously mentioned, AFALD has no authority to direct the PM to consider LCC, but it does have the authority to present to the PM, for his consideration through the PAR/SPR/LAR process, those LCC factors that it feels are of importance. This rising influence has been reinforced and supported by the matrix of organizational relationships that AFALD has forged with the other members of the acquisition community, i.e., PRAM, KC-10. In the opinion of the researchers, this increased influence of AFALD is of great significance because it proves that LCC

is no longer just a "catch phrase". Life Cycle Costs and life cycle costing have become working tools that have been or are being institutionalized and routinized in every acquisition organization throughout the United States Air Force.

Advocate vs. Adversary

AFALD considers itself to be an advocate for life cycle costing. That is, it attempts to ensure in any new procurement that LCC factors are considered before decisions are made (48; 49; 80). In order to accomplish this task, AFALD has been operationally placed outside of AFSC. This decision was made by CSAF in order to emphasize life cycle cost considerations (34).

As such AFALD is an "adversary" of AFSC. In this context the word adversary is not meant or implied to mean that AFALD and AFSC are enemies. What this means is that inasmuch as AFALD is outside of AFSC command channels, it is able to offer advice to AFSC's SPOs that perhaps could not be generated internally. This relationship is a healthy one and not detrimental to either command. Each DPML has the freedom to speak up when he believes that an opportunity exists to lower eventual O&S costs on a new weapon system (30: 33). This freedom of the DPMLs to "tap on the shoulder" the PM materially aids the acquisition process to

eventually acquire better weapons systems. This evidence additionally indicates that the organizational placement of AFALD is well advised, considering the current acquisition environment.

Singleness of Purpose

AFALD has the stated goal of driving down O&S costs of new weapons systems, or as General Poe stated:

> . . . That's what life-cycle cost [is]--the cost of designing reliability into a system vs the cost of making it work if we don't [48:79].

In order to make this concept work there should be no question as to the singleness of purpose of AFALD. We (the authors) refer to the inclusion of any organizational subunit within AFALD that would detract from this goal-directed motivation. So, therefore, any addition to the organization of AFALD that does not increase or contribute to the pursuit of this goal should not be a part of the organization.

Since AFALD is an advocate of life cycle costing, and an adversary of AFSC, in order to make contributions to the development of new weapons systems it would be difficult for AFALD to criticize the KC-10 program in AFALD. It is recognized that no PM was ever promoted for saying that his system is not of the very best (21:178-179). So then if the Deputy for KC-10 (AFALD/YT) is an advocate of his program, how can AFALD project an image of an

adversary? The answer is it cannot. The placement of the Deputy for KC-10 in AFALD could possibly raise doubts as to the precise role of AFALD. Therefore, it would appear to the authors that the placement of the KC-10 in AFALD should be reconsidered.

Role Playing Within the Acquisition Community

The evidence presented during the previous discussion, plus the historical development of the USAF acquisition structure, indicate that there is some amount of confusion as to the precise role of not only AFALD but also the other members of the acquisition community. It is this confusion or overlap of organizational roles that will be discussed.

The inclusion of the Deputy for KC-10 in AFALD, which was directed by CSAF, is an indication that there exists some uncertainty as to the role of AFALD (60). Another example is the existence of three test organizations at Edwards AFB, CA. As previously mentioned, they represent AFSC, AFLC, and CSAF (4; 61; 66; 67). These questions can be raised: Why three? Would not one autonomous organization serve the Air Force's needs better in the test and evaluation of new weapons systems? A third example of uncertainty is the existence of a logistics organization within each of the product divisions of AFSC. These units

to some extent duplicate the functions that have been granted to AFALD (73; 75). This conclusion, arrived at through deductive logic, points to the absence of a clear, concise definition of each member's role. This statement of policy as contained in an Air Force directive or regulation may not exist. In its absence the recommendation is made that it should exist, and that HQ Air Force should consider providing same. If this guidance exists, then we recommend its widest dissemination. They (the Air Force)

> . . . may need to take a more active role in intervening in the process of interactions between [Air Force] organizations to increase the probability of achieving policy results desired [56:234].

Recommendations for Further Research

No research is ever truly completed. This is naturally applicable to this thesis. Therefore, this section of the chapter has several recommendations to continue and broaden the research thus begun.

The first recommendation is to examine in further detail the responsibility split exemplified by the Program Management Responsibility Transfer (PMRT). This split in responsibility, for various aspects of the acquisition process, has been made at several points, both in the process and at various times. An examination of this split,

the need for it if a need exists, and recommendations for improvement should be undertaken.

The second recommendation is derived from the first. It is known that the implementation of the broad guidelines provided by DOD for the acquisition process have been interpreted differently by the various Services. In particular, neither the United States Navy nor the United States Army utilize a structure similar to that used by the USAF. The possibility exists that their organization, structured to procure and support new weapons, may have elements that are superior to those methods presently being used by the USAF. It is suggested that a research be instituted to compare and contrast these various acquisition methods so as to enhance our own methods.

APPENDIX A

GLOSSARY OF TERMS

APPENDIX A

Concurrency--As defined by the Commission on Government Procurement, concurrency is a name given to the process of overlapping the development, production, and related testing functions of a weapon system program [3:7].

Decision Coordinating Paper (DCP)--The principal document to record essential system program information for use in support of the Secretary of Defense decision-making process at Milestones I, II, and III [77:1].

Defense System Acquisition Review Council (DSARC)--The council has responsibility to review major and important weapon system acquisition programs at appropriate points in their life cycle. These reviews are made to permit coordinated evaluation and deliberation among senior DOD managers, and to assure that complete and objective advice is given the Secretary of Defense upon which to base his decision to proceed to the next step in the system's life cycle [3:7-8].

Design to Cost--A management concept wherein rigorous cost goals are established during development, and the control of system costs (acquisition, operation and support) is achieved by practical trade-offs among operational capability, performance, cost, and schedule. Cost, as a key design parameter, is addressed on a continuing basis and as an inherent part of the development and production process [20:c-1].

Life Cycle Cost--Total cost to the government of acquisition and ownership of a system over its full life, including the cost of development, acquisition, operation, support, and where applicable, disposal [20:c-1].

Limited Production--The initial, low rate production of a system in limited quantity to be used in operational test and evaluation for verification of production engineering and design maturity and to establish a production base prior to a decision to proceed with production [77:1].

Major System Acquisition—A system acquisition program designated by the Secretary of Defense to be of such importance and priority as to require special management attention [77:2].

Mission Element Need Statement (MENS)—A statement prepared by a DOD Component to identify and support the need for a new or improved mission capability. The mission need may be the result of a projected deficiency or obsolescence in existing systems, a technological opportunity, or an opportunity to reduce operating cost. The MENS is submitted to the Secretary of Defense for a Milestone 0 decision [77:2].

Operating and Support (O&S)—Those costs associated with the maintenance, logistics support and operation of a system over its life [20:c-2].

Operational Test and Evaluation (OT&E)—Test and evaluation conducted to estimate the system's military utility, operational effectiveness and operational suitability [77:2].

Program Management Responsibility Transfer (PMRT)—A transfer of responsibility for management of a new program which occurs after delivery of the weapons system to the using command. Program management formally changes from AFSC, the procuring command, to AFLC, the supporting command (32:51-52).

Program Manager--The individual in the DOD chartered to manage a major system acquisition program [77:2].

Prototype—A prototype is an item that is essentially hand built. It is fabricated on very simple tooling that is discarded after the prototype is complete. The prototype has the shape and the major subsystems of the production article that it simulates. Under concurrency, the production line tooling is set up and the first item produced becomes the test item and may be referred to as a prototype. For this paper, however, prototype will always refer to the 'hand built' philosophy [3:8].

Reliability—Probability that materiel will perform its intended function for a specified period of time under stated conditions [20:c-2].

(Service) System Acquisition Review Council ((S)SARC)—A Council established by the Head of a Military Department as an advisory body to him and through him to the Secretary of Defense on major system acquisitions. The (S)SARC is chaired by the Secretary/Under Secretary of the Military Department and is similar in functional composition, responsibilities and operation to the DSARC. In application the term (Service) is replaced by the designation of the applicable Military Department, i.e., ASARC, NSARC and AFSARC [77:2].

Subsystem—A major functional grouping of weapon system components or equipments, e.g., Propulsion System [20:c-2].

System—A complete weapons system, i.e., an aircraft [20:c-2].

System Acquisition Process—A sequence of specified decision events and phases of activity directed to achievement of established program objectives in the acquisition of Defense systems and extending from approval of a mission need through successful deployment of the Defense system or termination of the program [77:2-3].

System Program Office (SPO)—The office of the program manager and the single point of contact with industry. Government agencies and other activities participating in the system acquisition process [77:3].

Weapons System—A composite of equipment, skills, and techniques that forms an instrument of combat which usually, but not necessarily, has an air vehicle as its major operational element. The complete weapon system includes all related equipment, material, services, and personnel required solely for the operation of the air vehicle, or other major elements of the system, so that the instrument of combat becomes a self sufficient unit of striking power in its intended operational environment [1:3].

APPENDIX B

GLOSSARY OF ACRONYMS

APPENDIX B

ADTC	Armament Development Test Center
AFAG	Air Force Auditor General
AFALD	Air Force Acquisition Logistics Division
AFALD/AQ	Deputy for Acquisition Programs
AQD	Directorate of Armament Logistics
AQE	Directorate of Electronic Logistics
AQI	Directorate of Logistics Integration
AQP	Directorate of Equipment Support
AQS	Directorate of Aerospace Logistics
AFALD/AX	Deputy for Avionics Control
AFALD/MI	Deputy for International Logistics
AFALD/PP	Deputy for Procurement and Production
PPA	Directorate of Procurement Operations and Support
PPE	Directorate of Contracts and Planning
AFALD/PT	Deputy for Product Evaluation Engineering and Test
PTD	Directorate of Air Force Engineering Data Support Center
PTE	Directorate of Engineering Services
PTF	Directorate of Flight Test Evaluation
PTP	Air Force Packaging Evaluation Agency
PTQ	Directorate of Product Performance Evaluation

PTX	Test Plans Office
AFALD/SD	Deputy for Readiness Development
SDD	Directorate of Propulsion Logistics
SDM	Directorate of Systems Programs
AFALD/XR	Deputy for Acquisition Analysis
XRS	Directorate of Concepts and Analysis
XRI	Directorate of Acquisition Procedures and Guidance
XRX	Directorate of Acquisition Plans and Management
AFALD/YT	Deputy for KC-10
YTA	Management Operations Office
YTE	Directorate of Engineering
YTF	Directorate of Program Control
YTJ	Directorate of Projects
YTL	Directorate of Logistics Support
YTP	Directorate of Procurement and Manufacturing
YTT	Directorate of Test and Evaluation
AFIG	Air Force Inspector General
AFIT	Air Force Institute of Technology
AFFTC	Air Force Test and Evaluation Center
AFLC	Air Force Logistics Command
AFLC/AQ	Deputy Chief of Staff for Acquisition Logistics
AFLC/CC	Commander, AFLC

AFLC/MI	Deputy Chief of Staff for International Logistics
AF/LG	Deputy Chief of Staff for Systems and Logistics (Air Staff)
AF/RD	Deputy Chief of Staff for Research and Development (Air Staff)
AFSAC	Air Force System Acquisition Center
AFSC	Air Force Systems Command
AFTEC	Air Force Test and Evaluation Center
ALC	Air Logistics Center
AMC	Air Material Command
ARDC	Air Research and Development Command
ASD	Aeronautical Systems Division
ATCA	Advanced Tanker/Cargo Aircraft
AU	Air University
BMD	Ballistic Missile Division
CC	Commander
CSAF	Chief of Staff of the Air Force
CV	Vice Commander
DCP	Decision Coordination Paper
DCS	Deputy Chief of Staff
DOD	Department of Defense
DODD	DOD Directive
DPML	Deputy Program Manager for Logistics
DSARC	Defense System Acquisition Review Council

ESD	Electronics Systems Division
FMS	Foreign Military Sales
GFAE	Government Furnished Aerospace Equipment
GOR	General Operating Requirement
HQ	Headquarters
ICBM	Intercontinental Ballistic Missile
IFB	Invitation for Bid
ILC	International Logistics Center
ILSO	Integrated Logistics Support Officer/Office
ILSP	Integrated Logistics Support Plan
IM	Inventory Manager
JPO	Joint Program Office
JTIDS	Joint Tactical Information Distribution System
LAR	Logistics Assessment Review
LCC	Life Cycle Cost
LTM	Less than Major
MENS	Missile Element Need Statement
MOA	Memorandum of Agreement
OER	Officer Effectiveness Rating
OMB	Office of Management and Budget
O&M	Operations and Maintenance
O&S	Operating and Support
OSD	Office of the Secretary of Defense

PAR	Program Assessment Review
PDM	Programmed Depot Maintenance
PM	Program Manager
PMRT	Program Management Responsibility Transfer
PR	Public Relations
PRAM	Productivity, Reliability, Availability and Maintainability Office
R&D	Research and Development
RFP	Request for Proposal
ROC	Required Operational Capability
SAR	Secretarial Assessment Review
SAF	Secretary of the Air Force
SAF/AL	Assistant Secretary of the Air Force, for Research, Development and Logistics
SAMSO	Space and Missile Systems Organization
SECDEF	Secretary of Defense
SM	System Manager
SON	Statement of Need
SPO	System Program Office
SRMAG	Systems and Resources Management Action Group
(S)SARC	Service System Acquisition Review Council
TAC	Tactical Air Command
WRAMA/CC	Commander, Warner Robins Air Material Area
WSMAG	Weapons System Management Study Group
WSPO	Weapons System Project Office

APPENDIX C

LETTERS AND MEMORANDUMS

APPENDIX C

DEPARTMENT OF THE AIR FORCE
Headquarters Air Force Systems Command
Andrews Air Force Base, DC 20334

23 MAR 1976

General David C. Jones
Chief of Staff
United States Air Force
Washington, D.C. 20330

Dear Chief

I have reveiwed Lieutenant General Hails' 25 February 1976 suggestion for improving the system acquisition and support process. His proposal primarily addresses the logistics aspects of the process and tends to disregard the system development that continues beyond the initial production decision. Transition of a system from AFSC to AFLC before the system development process is essentially complete would be counterproductive. I believe the proposal misses the mark.

To achieve our goals, ownership costs must be emphasized throughout the acquisition cycle. By DSARC III, plans and actions have essentially fixed the reliability, maintainability, and supportability of a system. Little can be done beyond that milestone to significantly reduce either operations or support costs.

AFSC's charter includes the important responsibility for minimizing life cycle costs. Our effort is geared to achieve this objective, while recognizing the need for a balance between performance, production costs, and operations and support costs. It is through these efforts that we must achieve optimum life cycle costs. To separate these efforts from system acquisition would only inhibit achievement of this goal. It would introduce a further split in responsibility and in engineering capability, and reduce the day-to-day interface needed to effectively design, develop, and acquire a system.

AFLC assistance in reducing operations and support costs is vitally needed. This can best be achieved by providing lessons learned and the data base upon which to base

realistic decisions regarding comparative costs to help decide what tradeoffs should be made and what contractual effort in the supportability area is needed. AFLC, in establishing their DCS/Acquisition Logistics, made a good start by emphasizing greater front-end involvement through their Deputy Program Managers for Logistics (DPML) in our Program Offices, and through increased coordination with the AFSC staff. I fully support greater AFLC involvement in the weapon system acquisition process-particularly in the early definitization of total support requirements. Therefore, I believe the "constructive confrontation"—perhaps "constructive challenge" is more descriptive—can be achieved within the present organizational structure provided all parties recognize the criticality of the support requirements and afford them their proper share of program resources.

Over recent months, AFSC has taken a number of actions intended to focus on operations and support costs. Following are some examples:

a. At HQ AFSC, I have reassigned the weapon system acquisition logistics function from my DCS/Systems to my DCS/Logistics. This places staff responsibility in the hands of specialists with the requisite expertise who interface with AFLC on a day-to-day basis.

b. AFLC representatives participate in most of our Business Strategy Panels and Request for Proposal Review Boards. This insures consideration of logistics early in the development/acquisition cycle. In fact, the Business Strategy Panels have served to force early definition and planning of the maintenance and support concepts.

c. HQ AFSC DCS/Logistics and DCS/Procurement and Manufacturing have negotiated Memorandums of Understanding with HQ AFLC DCS/Acquisition Logistics. These agreements are designed to strengthen intercommand relationships and better define command responsibilities in areas of common interest.

d. In the past few months, I have gained a greater visibility of logistics support requirements and related problems from both my staff and the AFLC representatives. This results from my DCS/Logistics staff representative

attending the DPML briefings that are presented to the Commander, AFLC and to HQ USAF DCS/Systems and Logistics. Likewise, AFLC representatives attend my PAR and CAR reviews.

e. AFSC employs using command senior enlisted maintenance personnel to insure that our logistics planning benefits from real world experience. Currently, both the F-15 and F-16 SPOs have senior NCOs assigned full time. This complements the NCO participation at the AFLC Resident Integrated Logistics Support Activity (RILSA) at the contractor's facility.

f. The Air Force Flight Test Center's 6515th Test Support Squadron was specifically created to conduct Technical Order verification and to make "dirty hands" inputs on reliability and maintainability during DT&E. Supporting and using command personnel under the operational control of the Air Force Test and Evaluation Center provide operational assessments during IOT&E. Although maintenance and logistics functions begin with the contractor support phase, there is a transition to blue suit support prior to the completion of testing. Our current direction is to insure more and earlier Air Force involvement in these support activities.

g. The recent establishment of a HQ AFSC DCS/Test and Evaluation will focus not only on performance testing, but validation of logistics supportability, compatibility of AGE, and Tech Order validation. Specific emphasis is being placed on early, active involvement by all participants to include the implementing, using, and support command representatives.

h. In the case of systems that have entered full-scale production, I intend to assign qualified "logistics" or "procurement" personnel as either the program manager or deputy program manager. This action will not only enhance these career fields, but will also bring business/logistics expertise to bear during the appropriate phase of the weapon system acquisition cycle.

i. Our Super PARs, Joint Operational Technical Reviews (JOTRs), and Program Management Assistance Group (PMAG) reviews all focus on the reduction of operations and support costs and the full range of supportability

considerations. In addition, the establishment of the Aeronautical Systems Division's Avionics Advisory Board and Support Equipment SPO exemplify initiatives to lower system operations and support costs by promoting standardization.

j. We now make wide use of incentives to focus contractor attention on operations and support costs. The A-10 and F-16 are important examples. Several million dollars of fee are available on these contracts. Award of the fee depends on future logistics costs.

The DPML system of operation is becoming increasingly effective. All major SPOs have a DPML physically collocated in the SPO, but organizationally assigned to AFLC's DCS/Acquisition Logistics. For those SPOs of smaller size, a contingent of AFLC logistics specialists are assigned to the AFSC Product Divisions. For example, ASD has approximately 40 AFLC personnel who provide logistics guidance to the smaller SPOs. Moreover, as the program manager briefs the HQ AFSC and HQ USAF staffs on the monthly PARs, the DPML parallels this review by covering the logistics support posture in depth with the Commander AFLC and the HQ USAF DCS/Systems and Logistics. This parallel status reporting provides a basis for AFLC/AFSC command interaction to focus on operations and support cost considerations. The effectiveness, of course, is highly dependent on the quality of the personnel assigned, and command emphasis and support that is afforded this effort.

I believe AFSC has a full range of initiatives aimed at reducing operations and support costs and improving system supportability. We have a close and continuing interchange with AFLC to utilize their special logistics expertise. Further improvement can be achieved by expanding AFLC's DCS/Acquisition Logistics organization to include a broader range of logistics expertise and assigning to this DCS higher quality personnel to support and influence the many AFSC program offices.

Let me conclude with the observations that decisions are often made at levels above AFSC and AFLC, albeit for good and valid reasons, that delay support funding in order to meet more immediate needs. The seemingly inevitable funding cuts that delete spares, AGE, training, and logistics data, as well as specific planned investments to reduce operations

and support costs, are significant contributors to the deficiencies in organic capability at IOC and the high operations and support costs of fielded systems. A case in point is the decision to delay B-1 support funding beyond FY77.

Further, we tend to expect a greater than reasonable degree of organic support capability for newly fielded equipment. Production aircraft, produced at a reasonable rate, are needed to fully test system supportability and to work out problem areas that are not manifested in DT&E aircraft built on "soft" tooling. Undue expectation of low NORS rates at IOC also results in large spare buys that become obsolete when configurations change. The operations and support implications of key decisions during the development and acquisition phases is an area that must be stressed at all levels.

I am convinced that adopting General Hails' proposal, which would result in a major shift in responsibility early in the acquisition cycle, would be a step backward-to essentially that of the old ARDC/AMC organization. We have the best acquisition process in the DOD today. It can and should be improved; our efforts cited above are steps in that direction. AFSC is committed to continuing this improvement.

Sincerely

S I G N E D

WILLIAM J. EVANS, General, USAF
Commander

25 March 1976

MEMORANDUM FOR RECORD

SUBJECT: Comments in Response to Gen Buckingham's Analysis of the LG Proposal to Improve Systems Acquisition

1. In par 2, Gen Buckingham concurs in the need to improve on the life cycle cost of weapon systems, but does not agree with the organizational changes and believes that the status quo should remain and simply states we should do better.

2. In par 3, Gen Buckingham alludes to the fact that in 1961 the major thrust in the reorganization at that time to establish AFSC was to marry research, development and production with the intent to strengthen the role of the program director. I view the reorganization was done because of the efforts prior to 1961 to concurrently develop and produce weapon systems - and under that concept of concurrency - it was vital that the program director be in control of both development and production. Because of the excessive and wasteful funds required with concurrency, I believe we will never again produce weapons under that philosophy and it is because of this change that I see the need to decouple production from development and create a union between production, modifications, logistics support and spares procurement. Where he alludes to the importance to the totality of the decision process, he apparently overlooks that my proposal is to keep the SPO intact, including the program director, and simply transition it from under AFSC to AFLC once full scale development is complete. This is different from the pre-1961 method of transition wherein new program directors were appointed at the time of change.

3. In par 4, Gen Buckingham alludes to the severe support problems of the B-36 and the B-47 which he attributes to the organizational alignments prior to the creation of AFSC. I, too, was involved in those two systems for three years while a member of the Norton IG Team in which we did several large scale studies of those two weapon systems. My view of the problems associated with the B-36 was not a product of the SPO organization which was run by Colonel Tom P. Gerrity, but rather it was the product of the basic

B-36 design deficiencies including the highly unreliable R-4360 engine. The B-36 was forced into operation before it was completely developed because of the urgent need for intercontinental range bombers. Similarly, there were serious shortcomings in the early avionics equipment and then the aircraft was so severely under powered that we were required to add the additional four J-47 engine pods to the aircraft.

As I recall from the IG study made of the B-47, the operational deficiencies were also a product of the sense of extreme urgency to equip SAC with a jet bomber in a hurry. This led to concurrency and the manufacture of the B-47 in three facilities - and by three contractors— Boeing-Wichita, Douglas-Tulsa and Lockheed-Marietta. The management of this program was, in fact, taken out of the normal project office structure and placed in Wichita, Kansas under Colonel Harley Jones and managed under what was called the WIBAC Program Office.

In both of the above cases, we have profound examples of extreme concurrency in development and production which has proven to be costly and disastrous. It was from this experience - coupled with a continuance in the philosophy of concurrency - which forced the creation of AFSC - i.e., a union between development and production in order to try to control configuration changes in production while full scale development is running concurrently.

4. In par 5, Gen Buckingham alludes to the desire for "cradle to grave" approach but quickly states it is impractical. I, too, believe the single organization would be desirable to solve cost of ownership problems, but I believe to encumber our research and development effort with all of the mundane problems associated with production and logistics support would inhibit our technological advantage we enjoy today vis-a-vis the Soviet. It was for this very reason that research and development was broken out in 1949 from a single organizational command.

5. In par 6, Gen Buckingham states that the key to reasonable achievement of a fully supportable system lies with having the responsible System Program Director. I concur with this and want this Program Director to remain with the program at the point of transition from full

scale development to production, but I want him to know from the outset that he will move to AFLC and be fully burdened with the ultimate support of the program. Gen Buckingham proposes giving "sincere consideration to making a logistician the Deputy System Program Director for major systems." We did this beginning in 1969 starting with the F-15 program and we have had some very capable deputies, including Col Homer Terry in the F-15 and Colonel Roccaforte in the B-1, but our problem is that his role is one of persuasion with no authority or control. Ask either one of these officers how much they influenced the program.

6. In pars 7 and 8, Gen Buckingham alludes to signs that the DCS for Acquisition at AFLC is evolving into an effective organization and he believes that just strengthening this organization would improve on the life cycle cost of the weapons system. After seven years of trying to bridge the relationships between AFLC and AFSC, and having been the conceiver of both roles - the Deputy Program Director for Logistics and the DCS/AQ - I have little faith that these efforts will achieve the objectives of improved support at reduced O&S costs. I attribute this simply to the fact that AFLC, under the current arrangement, holds no authority and no control over the program nor the contractor. I believe my proposal will remedy this without detriment to research and development.

S I G N E D

ROBERT E. HAILS
Lt General, USAF

THE DEPUTY SECRETARY OF DEFENSE
Washington, D.C. 20301

FEB 28 1976

MEMORANDUM FOR The Secretaries of the Military Departments

SUBJECT: Reduction of Outyear Operating and Support (O&S) Costs

I am seriously concerned with the continuing growth of the fraction of the total DoD resources needed to operate and support our weapons and the decline in funds for new weapon procurement. A means to increase real DoD purchasing power is to increase emphasis on controlling the outyear operating and support costs of weapon systems during the development and acquisition phase both through attention to design, procurement, and support planning. We must have the dual objectives of reducing the fraction of the outyear DoD budget allocated to weapon O&S costs while at the same time maintaining operational readiness.

My 16 October 1975 memorandum to you, Subject: Visibility and Management of Support Costs (MBO 9-2), described one important aspect of this action plan - improving the visibility and management of support costs. While I am confident that we can achieve the ability to identify and track these costs, I am equally concerned that insufficient attention is being paid to controlling eventual system O&S costs during conceptual, validation and full-scale development phase of new systems. My objective is to achieve an overall reduction in the fraction of each Service's outyear budget allocated to O&S cost in the outyears by focusing now on reducing the O&S costs of the new systems we are developing.

Specifically, I am requesting that each Service establish O&S cost targets for each system in development to support the above objective and follow up on the achievement of such targets. For the near term, the approach should be to identify in the DCP/DSARC process, the incremental O&S cost impact of each weapon decision (in terms of the O&S cost impact of planned replacement or augmentation of a function), and to periodically assess the extent to which

the decisions taken collectively support the broad objective. Any net growth would then require tradeoffs to support the objective of overall reduction of the O&S cost fraction in the outyears. Such could include a search for more effective support concepts as well as conceptual and design tradeoffs to meet the need. Decisions on new weapons will be heavily influenced by the extent to which each program contributes to the objective.

The attachment provides guidance in the areas where attention should be focused for greatest payoff. I expect this guidance to be applied at all levels of the Services and that progress toward meeting the objective will be reviewed at the highest levels. I will need your full support to make this policy succeed. From this time, each DSARC review is to specifically address the O&S cost impact of new systems compared to those to be replaced or augmented; and efforts which have been made or are required to achieve a net outyear reduction whenever feasible. Within three months I would like to have your planned approach to establishment of O&S cost goals for all major programs now in the DSARC process (with emphasis on those prior to DSARC II) and the methodology for an annual assessment of the net O&S cost impact of decisions in the prior year. The first such assessment could be submitted for my review a year from this date.

S I G N E D

W. P. CLEMENTS JR.

DEPARTMENT OF THE AIR FORCE
Headquarters Air Force Systems Command
Andrews Air Force Base, DC 20334

3 APR 1976

Reply to
Attn of: CV

Subject: Strengthening the AFLC Acquisition Logistics Role

To: HQ USAF/LG

1. Reference General Evans' 23 March 1976 letter to General Jones which provided our views on your original suggestion for improving the system acquisition and support process. We have reviewed your modified proposal which was unofficially forwarded to AFSC for coordination. While the current version is not as sweeping as the original, it still contains several fundamentally troubling aspects which warrant further comment.

2. We are particularly distressed with the fact that the proposed letter and plan seem to carry a strong implication that Systems Command is not attuned to the operating and support (O&S) costs aspects of systems under development. It further suggests that there are studies or other data that would support a conclusion that a major realignment of responsibilities between AFLC and AFSC would produce the suggested benefits; this is simply not the case. While improvements can always be made to this very dynamic process, we strongly object to that flavor in the letter. Our 23 March letter pointed out the initiatives which have been taken recently, many in concert with AFLC, to focus increased attention on O&S costs. Further, the proposal has tended to pit AFSC and AFLC against each other as antagonists. This is most unfortunate as cooperation and close working relationships between the two Commands are essential. A constructive challenge relationship is necessary and healthy; an adversarial relationship is not.

3. Your revised letter has backed off from the strong position taken earlier for AFLC to assume program management responsibility at the production decision. However

the letter suggests that an early AFLC/Acquisition Logistics Division (ALD) and AFSC examination be undertaken of certain Aeronautical Systems Division procurement and production functions for possible transfer to the new Divisions. Any study of possible changes to the present mix of AFSC/AFLC responsibilities should only be undertaken by a higher level, more broadly based General Officer group. It is totally inappropriate for this task to be assumed by the new Division. With regard to the specific item of possibly transferring "total acquisition management" responsibility for certain aircraft systems, such as the F-4 and C-130, to the new Division, we believe this idea to be both disassociated with and counterproductive to the main thrust of the proposal which we do support, i.e., the strengthening of AFLC capabilities in the front end logistics process. This would unnecessarily divert the new Division's energies and attention, which should be concentrated on improving its acquisition logistics capabilities and on O&S cost reduction. Further, these systems have already been "transitioned" to the responsible Air Logistics Centers. AFSC residual responsibilities involve only the actual procurement of these systems. This division of responsibilities eliminates any duplication of major system procurement functions and maintains procurement continuity.

4. While your proposed letter is not entirely clear on this point, it appears to indicate that a different relationship is planned between the new ALD and the AFSC program offices at ASD and those at the other product divisions because the ALD Headquarters would be located at Wright-Patterson AFB. We would strongly argue against any change in the AFSC program manager/DPML relationship which would disrupt the current mode of operations in which the DPML or AFLC acquisition personnel are assigned to and work directly for the program manager. There is undoubtedly a shortage of fully qualified acquisition logistics personnel; formation of the new organizational structure must not be allowed to draw down resources directly involved in day-to-day operations. While normal rotation of personnel between the new Division and AFSC Product Divisions does promise long term benefits; resources to man the Division should be provided from AFLC internal reprioritization.

5. We fully support the goal of strengthening the AFLC capability to reduce O&S costs which prompts elevation of the acquisition logistics function to Division status.

The proposed change recognizes the increasingly vital role these cost considerations must play in helping to define support requirements for systems in acquisition as well as in the logistics community itself. We would caution, however, that this increased emphasis neither suggests nor supports a broader initiative to seek fundamental changes to the existing and time-proven roles and responsibilities of the two Commands.

S I G N E D

ROBERT T. MARSH, Lt Gen, USAF
Vice Commander

APPENDIX D

AFALD MANAGEMENT REPORT

APPENDIX D

"The Second Year"

II. AFALD ACCOMPLISHMENTS

Specific accomplishments and activities are summarized in this section. Items are presented under the following major topics - Importance of DPML/ILSO, Program Management of KC-10, Life Cycle Cost, Business Strategy and Contracting Methods, Logistics Planning Techniques, Feedback Loop and Engineering Investigations, Challenging Requirements, Laboratory Interface and International Logistics.

Importance of DPML/ILSO

The cutting edge of the AFALD mission rests with our Deputy Program Managers for Logistics (DPMLs) and Integrated Logistics Support Officers (ILSOs), who are colocated with and provide direct support to AFSC program offices. The DPMLs and ILSOs are assigned responsibility for the total logistics planning role which includes interface with the ALCs, Aerospace Guidance and Metrology Center (AGMC), and using commands. This is demonstrated in the case of the high priority Air Launch Cruise Missile (ALCM) program - a major development program which in turn, requires extensive modification to the B-52 and its avionics subsystems. AFALD is providing the logistics interface between the major agencies involved (Aeronautical System Division, Oklahoma City-Air Logistics Center (OC-ALC), Strategic Air Command and the Joint Cruise Missile Project Office (JCMPO).

The DPMLs in the Strategic System Program Office and the JCMPO are the AFALD representatives providing the interface. They have taken the SAC logistics requirements to the developers (ASD, JCMPO) to assure that supportability is "designed-in" to meet operational needs. The DPML and the B-52 system manager work together to develop systems which are compatible with present and future B-52 weapon system configurations.

Major emphasis has been placed on management and support of our DPML/ILSO resources. A new policy regulation (AFALDR 800-2) clearly defines the functional responsibilities of the DPML/ILSO and provides guidance for operation

of the direct support elements. The regulation also provides performance evaluation standards for determining the value added of DPML/ILSO resources and serves as a measure of his effectiveness to the program. Technical assistance teams were established by AFALD to provide direct support to the DPML during critical phases of the acquisition cycle.

The stature and importance of the DPML was increased within program offices. One example is the elevation of the DPML within the F-16 System Program Office (SPO) which enables him to exert greater logistics emphasis throughout all F-16 SPO directorates. Another example is the dual role assigned to the Strategic System DPML. In addition to managing the development and acquisition of support resources he is responsible for managing a $1.6 billion modification program. Major program DPMLs now attend Secretarial Program Reviews (SPR) to provide the logistics balance.

This increased stature and importance of our major program DPML's has been most beneficial to their roles in reducing costs. Through their efforts, cost avoidances of over $75 million in support equipment alone were realized on the Joint Tactical Information Distribution System (JTIDS), F-16, E-4 and Cruise Missile programs. A summary of these and several other accomplishments follow:

- ADVANCED MEDIUM STOL TRANSPORT (AMST) - The DPML with assistance from the AFALD staff, was able to successfully challenge and reduce user generated requirements which resulted in development savings of $36 million, projected production savings of $253 million and a reduction in O&S costs of $385 million, while providing the using command with a product that can meet all mission requirements.

- JTIDS PROGRAM - The DPML was directly involved in establishing Air Force alternatives for the installation of JTIDS terminals on fighter aircraft. To reduce the cost of aircraft integration and follow-on modifications for internal JTIDS installations, a concept for externally carrying JTIDS in a Maverick pod was developed and approved by the Air Force Council. The JTIDS/Maverick installation will use existing displays and controls on the F-4E, F-4G, F-111F, and A-10 Maverick-equipped aircraft. This approach will result in an estimated $400 million modification cost

avoidance, while maximizing the availability of JTIDS for Maverick-equipped tactical aircraft. The JTIDS DPML also developed an intermediate level support equipment strategy for the fighter terminals which consists of common support equipment that can be used to support JTIDS terminals on various aircraft. This approach will minimize separate nonrecurring development costs which would otherwise be expended to modify the F-15 and F-16 Avionics Intermediate Shop (AIS) automatic test equipment (ATE) and will result in an estimated cost avoidance in excess of $20 million.

- AIR LAUNCH CRUISE MISSILE PROGRAM (ALCM) - The DPML was successful in using the Electronic System Test Set (ESTS) that was previously developed for the B-1 and SRAM-B programs to satisfy ALCM requirements. This represents an estimated savings of over $50 million.

- E-4B PROGRAM - The DPML performed a review of all contractor recommended support equipment. Support equipment requirements for Initial Operational Test and Evaluation (IOT&E) were reduced. This action resulted in an estimated $3-4 million cost avoidance.

- F-16 PROGRAM - the F-16 Dynamic System Simulator (DSS) will be used as a piece of depot support equipment to test and update changes to the F-16 Fire Control System. In addition, the system can be used as an interim trainer for TAC air crews. A system which will meet the needs of the depot is in use by the Air Force Avionics Laboratory to accomplish the independent validation and verification of the operational software. The AFALD, in a joint effort with the F-16 DPML, Ogden ALC engineers and the Avionics Laboratory personnel, is working to procure and integrate the DSS into the depot avionics integration shop at Ogden ALC. This effort will result in early hands-on experience with the system for depot engineers, provide TAC with an interim trainer, and save from $2-5 million dollars over buying the system through the prime contractor.

To provide functional support for the DPML/ILSO, the AFALD has developed and implemented a concept of Planning Advisory Group Reviews (PAGRs). Teams of experts from the various logistics disciplines are established and dispatched to selected major programs for an in-depth assessment of logistics program activities. Deficient areas are identified and assistance is then provided to the DPML and the program manager. To date, PAGRs have

been completed on 11 of the 15 major programs and the results have been excellent. As an example, the E-4 DPML was able to capitalize on the use of Government Furnished Equipment (GFE) and local manufacturing to reduce support equipment costs by an estimated $1.2 million.

Logistics Assessment Reviews (LAR) were implemented at the AFSC product divisions to evaluate and determine the logistics adequacy of "less than major" programs. LARs have become a joint venture with AFSC and now include ALC and major command participation. This cooperative effort results in a coordinated approach to resolve or avoid logistics support problems during the early stages of selected programs. Early payoffs include better integration and scheduling of modifications, increased emphasis on interoperability, and development of compatible operating and maintenance concepts.

Program Management of the KC-10

As manager of the KC-10 program, AFALD completed source selection on the Advanced Tanker Cargo Aircraft. Fixed price contracts were awarded to Douglas Aircraft Company for both the aircraft and logistics support. Negotiations resulted in substantial discounts being offered on all aircraft, with a potential savings of more than $9 million per aircraft based on a specified 5-year funding profile.

From the start, the KC-10 program has pioneered new acquisition and logistics support procurement methods. Among the more innovative steps were: competing and awarding contractor logistics support concurrently with aircraft purchases; structuring a flexible acquisition contract which can accommodate changes in program funding; limiting competition to an FAA certified, wide-bodied aircraft to avoid building a new system; and allowing the contractor to fit aircraft deliveries into established production schedules. The high degree of commonality between the KC-10 and its commercial counterpart allows us to benefit from the existing worldwide DC-10 logistics support system. The Air Force can take advantage of commercial spares inventory, repair facilities and repair specialists already in the field. This should realize a 25% support cost savings over the life of the system. Commercial concepts like economic price adjustment, as well as warranty and service life, were also included in the contract.

The KC-10 program is managed by a Joint (AFLC/AFSC) Program Office (JPO). These two commands have maintained continuous interaction on this program as evidenced by integration of the AFSC managed Advanced Aerial Refueling Boom Development Program within the JPO. This advanced boom will be incorporated into the KC-10 and represents the latest technology in boom development.

The Program Office established a new directorate located at the contractor's facility. This office will provide on-site liaison and communication between the contractor, the program office, the Federal Aviation Agency and the Naval Plant Representative at the contractor's plant. They will also participate in upcoming preliminary and critical design reviews on all subsystems of the KC-10 aircraft. These reviews provide an opportunity to verify that the engineering design of the aircraft modifications meet all program, contract and performance requirements. The reviews also provide a unique opportunity to influence downstream costs based on the logistics support contractor's assessment of the impact of these system designs on future operation and support costs.

Life Cycle Cost (LCC) Activity

The AFALD is the leader in making life cycle costing an integral part of the acquisition management process. The Air Staff, HQ AFLC, HQ AFSC, and AFSC Product Divisions look to us to implement and refine life cycle costing policy. We developed major portions of AFR 800-11 (Life Cycle Cost Management Program) and are currently working with HQ AFSC in writing a joint AFSC/AFLC supplement to that regulation.

The Assistant Secretary of the Air Force for Research, Development and Logistics has sponsored an initiative to make life cycle costing a standard way of doing business. AFALD identified major areas of acquisition management which must be changed in order to comply with this long-range objective. We developed standard Program Assessment Review/Secretarial Program Review (PAR/SPR) reporting requirements and life cycle cost analysis techniques to ensure consistency. This includes the development of uniform cost element structures for generic weapon system types; standardization of program evaluation and funding techniques; and working with HQ USAF Comptroller to establish and annually update weapon system operations and support baselines. These efforts improve the comparability of data for DOD decision makers and program managers.

Examples of life cycle costing efforts follow:

- Through a joint ASD and AFALD Life Cycle Cost/Design-to-Cost (LCC/DTC) Advisory Group, our personnel act as consultants to individual program managers in structuring overall life cycle costing strategy and in identifying AFALD support resources.

- Over the past year, source selection evaluation support was provided to more than 30 AFSC programs.

- Eighteen marginal cost-effectiveness analyses in support of program management decisions were performed this year. Examples include a decision analysis on the F-15 Inertial Navigation System depot repair process, and independent cost analyses for the E-4 and C-141 Stretch Program.

- Life cycle cost analysis methods are continually being developed and improved to reflect the equipment's environment and operating characteristics. This includes improvement of the AFLC logistics Support Cost Model as well as tailoring specialized models in support of specific program applications (e.g., JTIDS and Tail Warning Set).

- We have assisted various programs in the application of support cost guarantee or warranty provisions (e.g., Ground Based TACAN, F3 INS, Standard AM/FM VHF Radio) and in some cases have structured the specific contract clauses.

- F-16 logisticians have been successful in reducing life cycle costs. A savings of $7 million was obtained by improving organizational maintenance manuals, $4 million by tailoring technology repair center automatic depot test equipment, and $10 million by using improved software update techniques on automatic test stations.

- AFALD was tasked to study the most economical maintenance posture for the APY-1 Radar used on the E-3A aircraft. The recommendations from this study, if implemented, will result in a life cycle cost savings in excess of $38 million, in comparison to the original maintenance concept.

- The jointly manned (ASD/AFALD) PRAM (Productivity, Reliability, Availability, Maintainability) office has reduced life cycle costs and improved force readiness.

Sixty-nine projects were completed this year and 53 have been identified for implementation. Life cycle cost savings are estimated to exceed $70 million. As an example, PRAM was responsible for the transfer of an improved aluminum bonding technology from industry to an ALC structural repair line. This new process is in operation and will account for an estimated $7 million reduction during the next five years.

BUSINESS STRATEGY AND CONTRACTING METHODS

The AFALD has provided direct support for the preparation of procurement packages and has been an active partner with AFSC in Business Strategy and Procurement Evaluation Panel reviews. In concert with the SPO and DPML/ILSO, innovative contract provisions were written and applied to specific programs. Where applicable, mean time between failures (MTBF) (some with verification tests) have been incorporated.

In early logistics planning and RFP preparation, a centralized capability was established to capitalize on lessons learned and provide a consistent approach to new program starts. This is particularly evident in the small programs which often require interface with other subsystems already in the inventory. This capability has strengthened the overall logistics management in each AFSC product division. The expertise developed during RFP formulation can now be carried over to the source selection process.

A unique availability guarantee was developed for the Harassment Weapon System, a mini remotely piloted vehicle. This system is a low cost, expendable strike vehicle where shelf-life is critical. The program is a joint venture between the United States and Germany. The availability guarantee assures the Air Force that this system will obtain a minimum launch rate of 80 percent at any point in time over its projected shelf-life (10-15 years). If the system does not meet the guarantee, the contractor is required to take corrective action at no cost. If the system exceeds the requirements, the contractor will share in the maintenance cost saving.

AFALD took an active role in restructuring the procurement approach to modify the Ground Based Tactical Air Navigation Beacon Transponder equipment. The original concept was to contract the analytical and administrative support for the application of a Reliability Improvement

Warranty (RIW). Rather than contract with industry, a joint AFALD/ALC team accomplished this task. The result was a $750,000 cost avoidance.

A maintenance cost guarantee was developed to reduce and control depot level labor and material costs. The strategy is to involve the contractor in support costing and planning, starting with early design and continuing through the fielding of the system. This provision is a significant addition to the contractual incentives available for use by the DPML/ILSOs.

As the result of our experiences with RIW/MTBF in systems acquisition, the AFALD has taken a lead role in the application of these provisions. Consultant services were provided to AFSC Product Divisions and the Air Logistics Centers in the development and tailoring of RIW/MTBF applications. This includes work on such programs as the F-16, JTIDS, B-52 Offensive Avionics System (OAS) and the F-16 Digital Electronic Engine Control (DEEC).

A verification test provision was developed by the LCC/DTC Advisory Group and incorporated into the contract for B-52 Common Doppler program. The test will measure the Doppler Velocity Sensor reliability in the operational environment and determine whether the system meets the guaranteed MTBF. In the event the contractor fails to meet the MTBF, negative incentives incorporated into the provisions will reduce the risk to the Government. This new provision is a step forward in assuring that the Air Force fields supportable systems.

AFALD and ASD combined their talents to structure the acquisition strategy for the ARC 186 standard AM/FM VHF radio. This team approach, which included the participation of Warner Robins ALC, capitalized on the successes of the ARC 164 UHF radio program. It resulted in the structuring of a life cycle cost approach which was tied to the source selection evaluation criteria. A competitive environment was maintained throughout and resulted in an estimated $3000 unit price reduction. This is an example of sound integration of acquisition and logistics requirements.

LOGISTICS PLANNING TECHNIQUES

Early program management decisions on depot maintenance concepts and provisioning account for a major

portion of a system's initial and follow-on support costs. Together with HQ AFLC and HQ AFSC, the AFALD has developed a new procedure for timely and systematic depot activation planning. One of the important features is the requirement for logistics planners to update the repair level analysis at critical points in the acquisition cycle. The purpose is to insure that significant cost changes in all logistics factors are considered in the final repair level decisions.

A program has been initiated to develop and apply provisioning strategy to acquisition programs prior to entering full scale development. Inclusion of these new strategies in the RFPs for full-scale development and production provides the Air Force the opportunity to evaluate the contractor's provisioning approach in a competitive environment. The program office can then make changes prior to contract award to assure we are buying the most effective and efficient initial product support.

An AFALD change to Support Equipment Acquisition procedures was approved by AFLC and AFSC and will appear in a joint regulation this September. This change will require contractors to submit a support equipment plan as part of their response to the full scale development RFP and to tie support equipment identification to subsystem design. This new approach will exploit the competitive environment and will identify support equipment requirements early enough to allow budgetary planning for GFE and timely delivery to the user.

Logistics Support Analysis (LSA) is a process performed by the contractor to integrate logistics support considerations with systems design and is the framework for developing and selecting support alternatives. AFALD developed procedures necessary for application of LSA techniques to a wider range of acquisition programs and is working directly with program managers to employ these procedures. During the Space Transportation System (STS) Ground System Support Integration Contract negotiations, the contractor was directed to propose a tailored application of MIL-STD-1388 (Logistics Support Analysis) to meet the requirements for a comprehensive analysis. This resulted in an estimated $4 million cost savings.

FEEDBACK LOOP AND ENGINEERING INVESTIGATIONS

A primary function of the AFALD is to provide a direct line of communication or feedback from the users

and maintainers of existing weapons systems to the designers and planners of new systems. The intent is to capitalize on the good and avoid the bad aspects of previous decisions so that less costly and more supportable weapon systems can be fielded.

During the past year, a managerial and technical "Lessons Learned" Data Bank became operational. The objective is to disseminate the information to where it can be most effectively used. In addition to responding to requests from users, a "tailored package" concept was designed. These packages have been produced for six programs to date; FB-111H, B-52 Tail Warning System, the A-10 Inertial Navigation System (INS), the Cockpit TV Sensor, the KU Band Radar Test Set, and the F-111 Computer Update Program.

Potential lessons are gleaned from conferences, field trips, test and inspection reports, program offices, the Maintenance Data Collection System, personal contacts, and any other source available. During the past year, we visited bases equipped with FB-111A, C-130, ICBM's and flight simulators. Talking directly with maintenance personnel about their problems provided us with feedback to identify potential lessons learned and/or PRAM projects.

Extensive problems associated with leaking seals (due to thermal expansion and contraction) in the F-4 hydraulic system were discussed with TAC maintenance personnel at Eglin AFB. Further investigation and follow-on with the Item Manager at OO-ALC revealed that replacement seals are made of a different material which is less prone to leak. AFALD engineers are investigating new aircraft systems to ensure they are using the newer seal material to reduce hydraulic leak potentials.

An AFALD team working on E-3A hydraulic tubing failures discovered that different techniques were being planned for the repair of lightweight stainless steel tubing on the F-16, A-10, and E-3A aircraft. A standard thicker tubing used on other USAF aircraft was identified and recommended as a standard replacement. This standard method of repair was approved for the A-10 and E-3A, and the approval for the F-16 is now being processed. Use of common replacement tubing, which is 35% cheaper than the original tubing, will reduce costs (stockage, training, and tooling) over the life cycle of the programs.

More logistics attention is being applied during the testing phase of a system's life cycle. A joint AFLC/Air Force Test and Evaluation Center (AFTEC) working group, which includes ALC participation, is addressing areas such as software evaluation and test team requirements. They recently developed a technique to evaluate the impact of spares availability on overall mission capability and will provide Operational Test and Evaluation (OT&E) inputs to contractual documentation.

Our test organizations at Edwards AFB and Eglin AFB played a major role in feeding back lessons learned from previous programs. For example, F-15 and A-10 experience was used to develop a new evaluation technique for the F-16 test program. As a result, fleet reliability factors will more accurately be provided to the ALCs for spares provisioning.

Feedback from the AFALD test organizations at Edwards AFB and concern expressed by USAF Safety Center prompted us to dig deeper into the problems associated with using hydrazine in aircraft systems. Hydrazine is used as an energy source for the Emergency Power Unit (EPU) on the F-16 and is an extremely toxic substance. AFALD and ASD are jointly chairing an executive review group, with membership from such organizations as Aerospace Medical Research Laboratory, Air Force Aero-Propulsion Laboratory, TAC and SAC. This group is investigating all aspects of using hydrazine in the flight line environment. The review will evaluate and recommend changes to the handling, servicing, and emergency procedures to be used in working with hydrazine. In addition, the group will be investigating alternate energy sources for the F-16 EPU.

The Maintenance Data Collection (MDC) System is complex and expensive. The AFALD is conducting a review of the high cost items as reported in the Product Performance (D056) and the Logistics Support Cost Ranking (K051) reporting systems. These systems use source data from the MDC system. The objective of the review is to quantify the utility of these systems in identifying our high cost items and to determine if proper corrective action is being taken or if lessons learned can be extracted from the systems and applied to new acquisition programs.

Differences between the reliability values observed during test and those experienced once a system is operational cause significant problems. This affects the

validity of initial spares provisioning and maintenance manloading computations. The Office of the Secretary of Defense tasked the AFALD to conduct a study to provide a relative comparison of the F-15 and F-16 from a reliability and maintainability standpoint, using the new standard R&M terminology as the baseline. The results provided estimates of mature aircraft R&M parameters and eliminated the high-level concern regarding the R&M characteristics of the F-15 and F-16 aircraft.

AFALD engineers are working with HQ AFLC to provide standard data products to report R&M values in a format which is compatible with the new Air Force standard R&M terminology. This will have a far-reaching effect on how we track reliability growth and will allow early identification of potential field reliability problems which can adversely impact system availability. Critical management decisions can now be based on more valid estimates of mature field reliability values.

Our engineering capability is being used to furnish more direct attention to reliability and environmental qualification testing. Assistance was provided to program offices in early planning for developmental testing to identify problem areas earlier and minimize redesign requirements. An example is the review conducted on the form, fit and function (F3), Inertial Navigation System development program. This review led to additional environmental testing, which will reduce the risk of redesign after the equipment is fielded.

One lesson learned initiative brought together aircraft users, maintainers, and designers to discuss fuel tank leaks. This problem is common to most aircraft and is responsible for maintenance costs of up to $12 per flying hour and reduced system readiness. Investigations showed that a unique sealing process called Scotchweld used on the F-102 and F-106 left these aircraft virtually leak-free. In a joint effort with AFSC engineers and the C-130 System Manager, AFALD engineers were able to apply this process to a C-130 integral wing tank to test the technique for future application. To date, over 300 flying hours have been accumulated with no recorded fuel leaks in the Scotchweld wing. The C-130 System Manager is now doing a cost trade study to determine if Scotchweld can economically be applied to the C-130 fleet.

A team of AFALD engineers played an aggressive role in a joint review of the F-16 fuel tank leak problem. This was a result of feedback from the test team at Edwards AFB about the magnitude of fuel leaks on the F-16. One goal of the review was to determine if the Scotchweld sealing system could be adapted to the F-16. While many factors made it impractical to redesign the F-16 fuel tanks to use Scotchweld, a number of engineering design changes and improved manufacturing procedures were developed to reduce fuel leaks. These changes will be incorporated in the production aircraft. As a result of our previous success the AFALD assisted the A-10 and A-7 program and system managers to resolve fuel leak problems. This same team actively participated in the early design of the FB-111H fuel tank.

Because of the increasing use, complexity and costs associated with embedded computer systems, AFALD is taking an active role in planning the management and support of computers and their software. Division personnel with ALC experience in the support of software are working with ALC DPMLs/ILSOs to accomplish early support planning and to develop support capabilities. While assigned to the ALQ-131 Electronic Warfare System Office, one of our engineers identified and corrected major deficiencies in the test requirements documents submitted by the contractor. Another AFALD engineer applied his experience in depot software support and developed a Computer Resources Integrated Support Plan for the F-16 Depot ATE.

A contributing factor to a catastrophic wing failure on a T-38 was inadequate fracture analysis of a minor modification and subsequent repair. A change in the A-10 production line and depot modification of all existing A-10 aircraft was required because of a minor change to the mission flight profile. Both of these examples highlight the critical nature of structural analysis and fracture mechanics. AFALD engineers are working with the Air Force Flight Dynamics Laboratory to expedite the development of a fracture mechanics design and repair handbook. The handbook will detail mandatory initial design and repair requirements and reduce the potential for future problems.

CHALLENGING REQUIREMENTS

The using commands Statements of Operational Needs (SONs) and Mission Element Need Statements (MENS) initiate the acquisition process and form the basis for systems

design and logistics support concepts. Although the requirements process is very complex, AFALD has achieved some degree of success in challenging requirements. Our logisticians have reviewed over 100 SONs and MENS this year to identify logistics constraints, perform cost-effectiveness trade studies, develop support concepts, and identify off-the-shelf options. For example a TAC proposal to increase the power of the H-3 helicopter engine was challenged and our position forwarded to HQ USAF. This change would have added weight, and necessitated a larger tail rotor, which would require more power to overcome the increased main rotor torque. The net increase in performance, after the $1.2 million modification, would be negligible. As another example, we consulted with TAC to identify logistics constraints for the Quick Strike Reconnaissance System. The results proved that the worst case scenario would be driven by long lines of communication and logistics rather than the size and strength of the opposing forces.

LABORATORY INTERFACES

During the FY 76-78 period, the Air Force Laboratories invested $100 million toward AFLC needs. The AFALD is working with the ALCs and the laboratories to institutionalize the AFLC/laboratory interface. In addition, we are working daily with the Air Force Laboratories to resolve logistics support problems. Examples of recent activities/accomplishments include development of a standardized honeycomb structures repair handbook to specify repair material and processes for increased structural durability; and use of laboratory capability to develop specifications and data required to obtain replacements for obsolete micro circuits for F-111 radar systems. The laboratories have also instituted a program to completely define the physical characteristics of the Scotchweld process to determine on what materials and in what environmental conditions it can be applied.

To ensure resources are expended on the most critical AFLC needs, a list of logistics problems was provided to the laboratories. Future activities will include developing test procedures for nuclear hardened systems, addressing bearing failures in gyros, corrosion of aircraft structures, and aircraft paint degradation.

INTERNATIONAL LOGISTICS

The Acquisition Logistics Division had management responsibility for Foreign Military Sales (FMS). In this

capacity, we provided front end planning and management of over $8 billion in logistics materiel and services for our foreign allies. Responsibilities included representing AFLC in negotiations of FMS programs, such as the potential E-3 sale to NATO. Because of the increasing volume of work and high visibility associated with FMS programs, the AFLC commander elected to establish the International Logistics Center under Headquarters AFLC [64].

SELECTED BIBLIOGRAPHY

A. REFERENCES CITED

1. Air University, Air Force Institute of Technology. A Compendium of Authenticated Logistics Terms and Definition. Technical Report No. 5, Wright-Patterson AFB, OH. June 1970.

2. Bell, Colonel, K. H., USAF. Deputy for KC-10, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 17 July 1978.

3. Bolton, Major Malcolm F., USAF. "AFSC and AFLC: An Argument for Merger." Unpublished research report, unnumbered, Air Command and Staff College, Maxwell AFB, AL, 1974.

4. Brantley, Colonel A. L. USAF. Deputy for Product Evaluation Engineering and Test, Air Force Acquisition Logistics Division. Personal interview. 5 July 1978.

5. Brennan, Francis. AFALD/SDM, Wright-Patterson AFB, OH. Lecture given in AFIT/LSG Course EM 5.57, "International Logistics: Seminar," Class 78B, 5 July 1978.

6. Buckingham, Major General Charles E., USAF. "A Look at the Acquisition Logistics," Air University Review, May-June 1975, pp. 35-40.

7. _____. The Comptroller of the Air Force. Letter, subject: Improving Systems Acquisition and Procurement (AF/LG Ltr, 25 Feb 76), to AF/CVA, 24 March 1976.

8. Childress, Major James, USAF. AFALD/Advanced Tanker Cargo Aircraft (ATCA). Wright-Patterson AFB, OH. Personal interview conducted by AFALD historian Dale Burk. 4 November 1977.

9. Christensen, Major Gerald A., USAF and Major Ronald J. Dierker, USAF. AFLC/ILC, Wright-Patterson AFB, OH. Lectures given in AFIT/LSG Course EM 5.57, "International Logistics: Seminar," Class 78B, 22 June - 6 July 1978.

10. Cleland, David I. and William R. King. Systems Analysis and Project Management. New York: McGraw-Hill Book Company, 1968.

11. Clements, W. P. Jr. Deputy Secretary of Defense. Memorandum, subject: Reduction of Outyear Operating and Support (O&S) Costs, to the Secretaries of the Military Departments, 28 February 1976.

12. Coogan, Colonel Charles O., USAF. Deputy for Acquisition Plans and Analysis, Air Force Acquisition Logistics Division. Letter, subject: AFALD Monthly Activity Report to AFIT/LSG (Col. Parlett), 20 April 1978.

13. Corley, Lieutenant Colonel Parris L., USAF and Lieutenant Colonel Arthur J. Roscoe, USAF. "Cost Control in Air Force System Acquisition." Unpublished research report No. 5560, Air War College, Maxwell AFB, AL, 1975.

14. Cost Analysis Improvement Group. Operating and Support Cost Development Guide for Aircraft Systems. Washington: Defense Systems Acquisition Review Council, 1974.

15. DeLuca, Lieutenant General Joseph R. Director Systems and Resources Management Action Group, USAF, AF/SRMAG. Letter, subject: Management Proposals, to Chief of Staff and Secretary of the Air Force, 31 December 1975.

16. Eaton, Colonel Elbridge P., USAF. "Let's Get Serious About Total Life Cycle Costs," Defense Management Journal, January 1977.

17. Erickson, Robert P. and John W. Wosina. "Designing to Cost on the XM1," Government Executive, May 1978, pp. 41-45.

18. Etzioni, Amitai. Modern Organizations. Englewood Cliffs NJ: Prentice-Hall, 1964.

19. Evans, General William J., USAF. Commander, Air Force Systems Command. Letter, no subject, to General David C. Jones, 23 March 1976.

20. Fiorello, Marco R. and Norman E. Betaque, Jr. "Aircraft System Operating and Support Costs: Guidelines for Analysis." Unpublished research report, unnumbered, Logistics Management Institute, Washington DC, March 1977.

21. Fox, J. Ronald. Arming America: How the U.S. Buys Weapons. Boston: Harvard University Press, 1977.

22. Galindo, R. Assistant Deputy for Readiness Development, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 5 July 1978.

23. Gansler, Jacques S. "A New Dimension in the Acquisition Process," Defense Systems Management Review, August 1977, pp. 6-12.

24. Guthrie, Major Michael, USAF. Chief of Business Strategy Division, Deputy for Procurement and Production, Air Force Acquisition Logistics Division. Personal interview conducted by Lynn C. Ervin, AFALD Office of History. July 1978.

25. Hails, Lieutenant General Robert E., USAF. DCS/Systems and Logistics. Letter, subject: Air Force Procurement and Production Changes, to AF/CC, 24 September 1975.

26. _____. Letter, subject: Improving Systems Acquisition and Procurement, to AF/CC (General Jones), 25 February 1976.

27. _____. Memorandum for Record, subject: Comments in Response to Gen. Buckingham's Analysis of the LG Proposal to Improve Systems Acquisition, 25 March 1976.

28. _____. Letter, subject: Transfer of ATCA Program Responsibility, to CSAF, 6 August 1976.

29. Hamilton, Colonel E. C. Jr., USAF. Director PRAM Program Office, Aeronautical Systems Division, Wright-Patterson AFB, OH. Letter, subject: Item for Historian (Your Ltr, 24 May 1977), to AFALD/DA, 12 April 1977.

30. Hansford, P. I. Assistant Deputy for Acquisition and Analysis, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 7 July 1978.

31. Haskell, Captain Steve M., USAF. Equipment Support Directorate, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 7 July 1978.

32. Hill, Colonel Vaughn E., USAF and Colonel Paul L. Martin, Jr., USAF. "Life Cycle Costing: Its Promise and Problems." Unpublished research report, No. 5995, Air War College, Maxwell AFB, AL, April 1976.

33. Johnson, Colonel K. R., USAF. Deputy for Acquisition Programs, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 5 July 1978.

34. Jones, General David C., USAF. Chief of Staff, United States Air Force (USAF). Letter, subject: Establishment of the Air Force Acquisition Logistics Division, to AFSC/CC (General Evans), 11 May 1976.

35. Jones, D. K. Former Assistant to the Commander of AFALD, Wright-Patterson AFB, OH. Personal interview conducted by AFALD Historian Dale Burk. 13 June 1977.

36. Kelly, Colonel Charles A., USAF. Chief of Staff, Air Force Acquisition Logistics Division. Letter, subject: AFALD Monthly Accomplishments Report for March 1978, to AFIT/LGS, 27 April 1978.

37. Leach, Captain Arthur S., USAF and Captain Dennis H. Majkowski, USAF. "An Analysis of the F-16 Offset Commitment." Unpublished master's thesis, GSM/SD/75D-16, School of Engineering, AFIT, Wright-Patterson AFB, OH, October 1975.

38. Lossbrock, John F., ed. "Air Force Logistics Command," Air Force, May 1977, pp. 56-57.

39. _____. "Air Force Systems Command," Air Force, May 1977, pp. 58-59.

40. _____. "Air Force Test and Evaluation Center," Air Force, May 1977, pp. 104-105.

41. Marsh, Lieutenant General Robert T., USAF. Vice Commander Air Force Systems Command. Letter, subject: Strengthening the AFLC Acquisition Logistics Role, to HQ USAF/LG, 3 April 1976.

42. McChesney, Major Jack L., USAF. AFIT/SL, Wright-Patterson AFB, OH. AFIT Course 5.23, "Procurement and Acquisition Management," Class 1978B. Lectures and intermittent personal interviews. 4-6 October 1977.

43. Miller, Lieutenant Colonel Edward P., USAF. "Current Systems Acquisition Realities." Unpublished research report No. 5349, Air War College, Maxwell AFB, AL, 1974.

44. Nunn, General George E., USAF. Inspector General. Memo, no subject, to Lieutenant General Boswell, Assistant Vice Chief of Staff, 9 March 1976.

45. Odle, Captain Richard I., USAF and Mollie Van Oss. Directorate of Systems Programs, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 11 July 1978.

46. Pate, John L. "Role of the Deputy Program Manager for Logistics in USAF F-16 System Program Office." Unpublished study, unnumbered, Defense Systems Management School, Ft. Belvoir, VA, May 1975.

47. Peele, Major Donald G., USAF. ASD/YFA, F-15 SPO, Wright-Patterson AFB, OH. Lecture given in AFIT/LSG Course FM 5.57, "International Logistics: Seminar," Class 78B, 5 July 1978.

48. Poe, Lieutenant General Bryce, II. "AFALD" Making Better Electronics Affordable," Air Force, September 1977, pp. 74-79.

49. _____. Commander Air Force Acquisition Division, AFALD/CC. Letter, subject: DPML/Directors' Conference, 22-23 September 1976, to AFALD members, 4 November 1976.

50. _____. "Getting Weapons That Do the Job." Speech given at St. Louis, Missouri, February 23, 1977, to American Defense Preparedness Association, supplement to Air Force Policy Letters to Commanders, AFP 190-2, June 1977.

51. Rhodes, Lieutenant General George E., USAF. Vice Commander, Air Force Logistics Command, Wright-Patterson AFB, OH. Personal interview conducted by AFALD Historian Dale Burk. 22 July 1977.

52. Rogers, General F. M., USAF. Commander Air Force Logistics Command. Letter, no subject, to General David C. Jones, 19 March 1976.

53. _____. Commander, Air Force Logistics Command, Wright-Patterson AFB, OH. Personal interview conducted by AFLC Historian Bob Smith. 12-20 December 1977.

54. Rutter, Brigadier General George R., USAF. Vice Commander, AFALD, Wright-Patterson AFB, OH. Personal interview conducted by AFALD Historian Dale Burk. 18 May 1977.

55. Schlosser, Lucille S. Director of Procurement and Production, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview conducted by AFALD Historian Dale Burk. 25 July 1977.

56. Schmidt, Stuart M. and Thomas A. Kochan. "Interorganizational Relationships: Patterns and Motivations," Administrative Science Quarterly, June 1977, pp. 220-234.

57. Shrode, William A. and Dan Voich, Jr. Organization and Management: Basic Systems Concepts. Tallahassee: Florida State University, 1974.

58. Singer, Robert A. "Acquiring Affordable Weapons Systems." Unpublished research report, unnumbered, Defense Systems Management College, Ft. Belvoir, VA, May 1977.

59. Slay, Lieutenant General Alton D., USAF. DCS/Research and Development. Letter, subject: SRMAG Proposal #7, Procurement Leadership and Performance (Your Ltr, 15 Mar 76), to AF/CC, 24 March 1976.

60. _____. Letter, no subject, to General Felix M. Rogers, Commander, AFLC, 8 September 1976.

61. U.S. Department of the Air Force. Air Force Acquisition Logistics Division (AFALD). AFLCR 23-17. Wright-Patterson AFB, OH, 8 September 1977.

62. _____. Air Force Acquisition Logistics Division (AFALD). AFLC/AQ discussion item for Corona Top 76. Wright-Patterson AFB, OH, 11 June 1976.

63. _____. Air Force Acquisition Logistics Division (AFALD) Implementation Plan. AFLC Programming Plan 76-17. Wright-Patterson AFB, OH, August 1976.

64. _____. "Air Force Acquisition Logistics Division (AFALD). The Second Year." Wright-Patterson AFB, OH, 1978.

65. _____. The Air Force Budget. Washington: Government Printing Office, March 1977.

66. _____. Air Force Flight Test Center. AFSCR 23-4. Andrews AFB, DC, 30 June 1975.

67. _____. Air Force Test and Evaluation Center. AFR 23-36. Washington: Government Printing Office, 19 July 1976.

68. _____. AFALD--An Unpublished History. Wright-Patterson AFB, OH, 1977.

69. _____. "AFALD: The 1st Year." Office of Information, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH, July 1977.

70. _____. AFLC Commanders' Conference Briefing, Wright-Patterson AFB, OH, 29 July 1976.

71. _____. Armament Development and Test Center. AFSCR 23-7. Andrews AFB, DC, 18 April 1973.

72. _____. Engineering History from McCook Field to the Aeronautical Systems Division 1917-1973 (Enlarged). AFSC Historical Publication, Wright-Patterson AFB, OH, May 1973.

73. _____. A Guide for Program Management. AFSC Pamphlet 800-3. Andrews AFB, DC, 9 April 1976.

74. _____. History of the Acquisition Logistics Division CY 1976 Volume I Narrative. Wright-Patterson AFB, OH, 20 January 1978.

75. _____. Organization and Function Headquarters Air Force Systems Command. AFSCR 23-1. Andrews AFB, DC, 7 March 1977.

76. _____. Report of the Joint AMC/NMC/AFLC Commanders Panel of Depot Maintenance Interservicing. Air Force Logistics Command, Wright-Patterson AFB, OH, 9 July 1974.

77. U.S. Department of Defense. Major Systems Acquisitions. DOD Directive 5000.1. Washington: Government Printing Office, January 1977.

78. U.S. Department of the Navy. Life Cycle Costs in the Acquisition of Weapon Systems. Naval Missile Center Technical Publication TP-74-21. Point Mugu, CA, April 1974.

79. U.S. Government. Major System Acquisition. A Discussion of the Application of OMB Circular No. A-109. OFPP Pamphlet No. 1. Washington: Government Printing Office, August 1976.

80. Walsh, Bill, ed. "View From the Top," Aviation Engineering and Maintenance, October 1977, pp. 9-20.

B. RELATED SOURCES

Blau, Peter M. and Marshall W. Meyer. Bureaucracy in Modern Society. New York: Random House, 1971.

_____ and W. Richard Scott. Formal Organizations. San Francisco: Chandler Publishing Company, 1962.

Brown, Thomas. Chief, Director of Procurement Planning, Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 3 November 1977.

Dover, Lawrence E., GS-13 and Captain Billie E. Oswald, Jr., USAF. "A Summary and Analysis of Selected Life Cycle Costing Techniques and Models." Unpublished master's thesis, SLSR 18-74B, AFIT/SL, Wright-Patterson AFB, OH, August 1974.

Evans, General William J., USAF. Commander, Air Force Systems Command. Letter, subject: Establishment of the Air Force Acquisition Logistics Division, to AFLC/CC, 7 June 1976.

Fiorello, Marco R. "Combat Vehicle System Operating and Support Costs: Guidelines for Analysis." Unpublished research report, unnumbered, Logistics Management Institute, Washington DC, June 1977.

_____. "Getting 'Real' Data for Life-Cycle Costing." Unpublished research report, unnumbered, Rand Corporation, Santa Monica, CA, January 1975.

Frypinger, Thomas C. "A Production Entry Approach to Weapon System Acquisition." Unpublished research study, unnumbered, Air Command and Staff College, Maxwell AFB, AL, May 1975.

Gibson, James L., John M. Ivancevich, and James H. Donnelly, Jr. Organizations: Behavior, Structure, Processes. Dallas, TX: Business Publications, Inc., 1976.

Hall, Edward T. The Silent Language. Greenwich, CN: Fawcett Publications, 1963.

Hampton, D. R., C. E. Summer, and R. A. Webber. Organizational Behavior and the Practice of Management. Glenview, IL: Scott-Foresman, 1973.

Herzberg, Frederick. "Wise Old Turk," Harvard Business Review, September-October 1974, pp. 375-385.

Karsten, Captain Ernst R., USAF and Captain Larry T. McDaniel, USAF. "Suggested Methods for Implementation of Life Cycle Costing Techniques in the Procurement of Air Force General Purpose Commercial Vehicles." Unpublished master's thesis, SLSR 9-74A, AFIT/SL, Wright-Patterson AFB, OH, January 1974.

Kast, Fremont E. and James E. Rosenzweig. Organization and Management: A Systems Approach. New York: McGraw-Hill, Inc., 1974.

Logistics Management Institute. "A Review of GAO Decisions of Life Cycle Costing." Unpublished research report, unnumbered, Washington DC, June 1974.

Luthans, Fred. Organizational Behavior. Boston: McGraw-Hill, 1973.

Payne, Major Isaac S., IV, USAF. "Investigation of the Short Range Cost Impact of Program Stretchout." Unpublished master's thesis, SLSR 18-75A, AFIT/SL, Wright-Patterson AFB, OH, September 1975.

Purvis, Kenneth G. "Chronic Logistic Support Problems After Transitioning." Unpublished research paper, unnumbered, Defense Systems Management School, Ft. Belvoir, VA, November 1975.

Rhodes, Lieutenant General George E., USAF. Vice Commander, Air Force Logistics Command. Letter, no subject, to Lieutenant General James T. Stewart, 20 May 1976.

Rogers, General F. Michael, USAF. "Early Initiatives in the Acquisition Process," Defense Management Journal, January 1977, p. 47.

Schlosser, Lucille S. "Acquisition Management," Contract Management, February 1978, pp. 7-8.

Shea, Joseph F. "Observations on Defense Acquisition," Defense Systems Management Review, August 1977, pp. 29-36.

Stewart, Lieutenant General James T., USAF. Commander, Aeronautical Systems Division (AFSC). Letter, no subject, to Lieutenant General George Rhodes, 28 May 1976.

U.S. Department of the Air Force. Air Force Contract Maintenance Center (AFLC). Wright-Patterson AFB, OH.

_____. Air Force Contract Management Division. AFSCR 23-16. Andrews AFB, DC, 17 April 1975.

_____. Life Cycle Costing: A Better Way to Buy. AFLC (MCCO). Wright-Patterson AFB, OH, January 1970.

_____. Terminal History: Aeronautical Systems Center (AMC) July 1960-March 1961. AFSC Historical Publication Series 61-50-6. Wright-Patterson AFB, OH, 1962.

Van De Ven, Andrew H. "On the Nature, Formation, and Maintenance of Relations Among Organizations," Academy of Management Review, October 1976, pp. 24-36.

Wolf, Ray S. Assistant Chief of Staff (Acting), Deputy for International Logistics. Air Force Acquisition Logistics Division, Wright-Patterson AFB, OH. Personal interview. 11 January 1978.